NEW YORK SEATTLE

MOTORSHIP

Devoted to Commercial and Naval Motor Craft

"MOTORSHIP" is entered as second-class matter at the Post-office at New York, N. Y., U. S. A. July, 1918, under the Act of March 3rd, 1879.
Office of Publication, 1270 Broadway, New York, N. Y.

Issued Monthly
PRICE 25 CENTS
Domestic, $3.00 per year
Foreign, $3.50 per year

NOVEMBER, 1919
Vol. 4 No. 11

CAMDEN FORGINGS

Manufacturers of
Large and Small Forgings

CAMDEN FORGE CO.
CAMDEN, N. J., U. S. A.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Contents copyrighted 1919

MOTORSHIP

Trade Mark, Registered

Head-Office:
1270 BROADWAY
NEW YORK, N. Y.

149 CALIFORNIA STREET
SAN FRANCISCO

71 COLUMBIA STREET
SEATTLE, WASH.

PUBLISHED MONTHLY IN THE INTERESTS OF COMMERCIAL AND NAVAL MOTOR VESSELS AND FOR RECORDING INTERNATIONAL PROGRESS OF THE MARINE INTERNAL-COMBUSTION-ENGINE

Published by MILLER FREEMAN & COMPANY

President—MILLER FREEMAN

Advertising Manager—J. CHARLES RUIF

Manager—RUSSELL PALMER

Editor—THOS. ORCHARD LISLE
A. M. S. Naval Engineers. A. M. I. Marine Engineers

Subscription rates: U. S. A. and Mexico, $3.00 per year. Canada and foreign countries in the postal union, $3.50. Single copies, United States, 25c. Great Britain, 1/6. Other countries, 35c.
"Motorship" is published on the 25th of the month, and all changes in and new copies for advertising must be in the hands of the publisher prior to the 5th of each month. Notice of discontinuance of advertising must be given before the 1st of the month, preceding issuance.

Great Britain—James Selwyn & Co., 20 Essex St., Strand, London, W. C.
Australia—Gordon & Gotch, Sydney & Melbourne.

The oil-engined motorship has arrived! It is such a pronounced economy that it was bound to come Nothing could stop it! And all obstacles have been removed as fast as they arose. The law of progress has seen to that. Very strong prejudices stood in the way of steam. But, one after another they were swept aside and steam reigned triumphant for a century. Steam now has had its day! Its zenith has passed, and gradually but surely it is being superseded by the economical internal-combustion power. Steamships are becoming decadent. America, the most important oil-producing country, is to be the greatest motorship-owning nation. Let us all co-operate and assist to make that day soon.

November, 1919 Vol. 4 No. 11

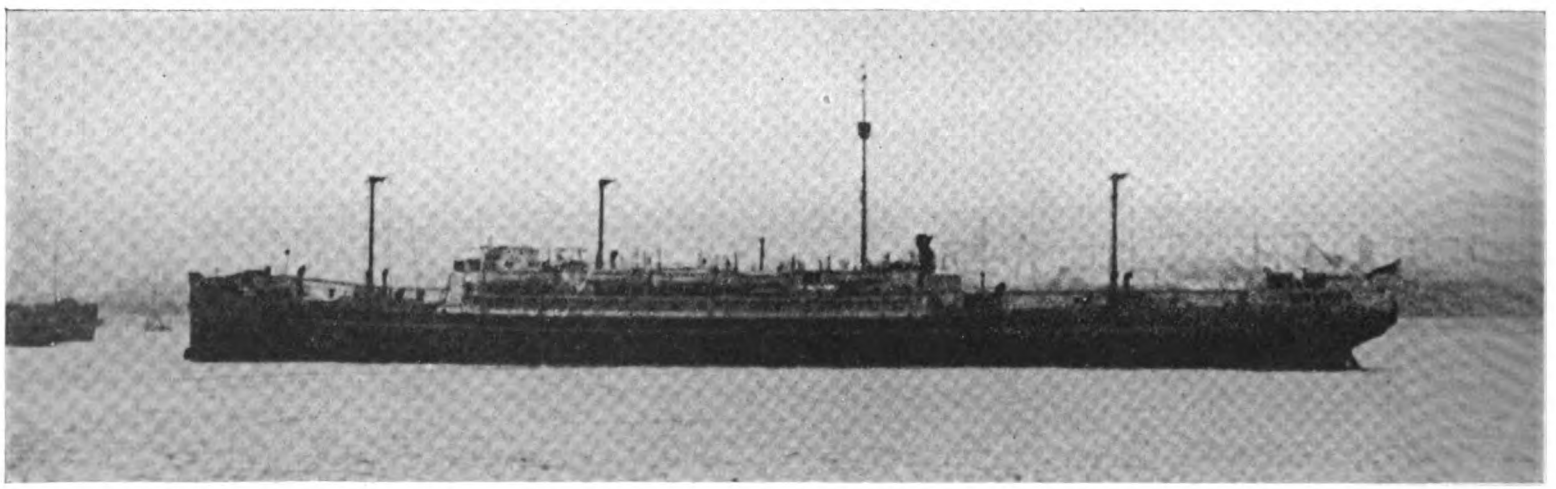
EDITORIAL

STOP—LOOK—LISTEN!

IT is easy to see that many shipowners in all maritime countries are drifting along in the old pre-war manner and are paying little or no serious attention to the economical motorship. On the other hand, some of the more progressive companies—particularly those financially associated with shipyards—are whole-heartedly proceeding with heavy-oil engined vessels, as has been frequently outlined in this jounrnal. In the shipping world to-day Gt. Britain and the United States are predominant, yet it is in these two countries that we find the greatest extremes in views on this momentous question, some owners still being as strongly prejudiced against the new power as others are for it, while the majority drift along in blissful indifference to the change that is swiftly taking place. At all the railroad level crossings in Long Island there is a big sign, STOP—LOOK—LISTEN! This forcible notice has saved many a disaster to motorists comfortably proceeding along without thought of what lies ahead. Many who have ignored the warning have run headlong to an unpleasant end.

Seeing that "Motorship" is of international importance, we feel that we are privileged to quote, "Stop—Look—Listen!" to both British and American shipowners who still are ordering uneconomical coal-burning and oil-fired steamers oblivious to what is going on before their very noses. We also take the opportunity to remind them that the U. S. A. can supply plenty of fuel-oil at prices ranging from eight shillings to seventy shillings per ton, according to the port of bunkering, and with heavy-oil motors at reasonable prices.

But why stop, look listen? may be asked. The reason is not far to seek. To-day the most successful shipbuilder and



Lord Pirrie's 20,000 tons displacement 14-knot motorliner "Glenapp" in her peace paint. This splendid Diesel-engined Glen Line passenger-cargo vessel should set every steamship owner thinking. Many duplicates are building on the Clyde and in Denmark. She burns less than 25 tons of fuel-oil per day. It is said that Harland & Wolff are erecting new Diesel-engine works at Belfast for the purpose of building the machinery of even larger trans-atlantic motorliners. What has America to show today? Has the Shipping Board been asleep on the job? Are American shipowners awake to the vital facts? Stop—Look—Listen!

Generated on 2024-09-13 14:06 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

shipowner in Great Britain is Lord Pirrie. This far-sighted man is buying up shipyard after shipyard, apparently for the purpose of constructing Diesel-engined motorships for the ship-operating companies under his control or associated with him.

So important does he appear to consider this type of cargo and passenger carrier that practically everyone in Lord Pirrie's employ has been forbidden by his direct orders to give out any information regarding the building and operation of such ships and their Diesel machinery. His large Diesel engine works in Glasgow are being greatly extended in order to provide sufficient motor machinery for about half a dozen or more shipyards.

Some of these vessels are fine craft of nearly twenty thousand tons loaded displacement and of 14 knots speed, but which use less than 25 tons of fuel per day. To our way of thinking Lord Pirrie, who, by the way, is said to be quite an important factor in that great Danish motorship owning concern—The East Asiatic Company—desires no publicity in order that his associated shipowning companies, such as the Glen Line, will have quite a respectable fleet of economical Diesel-driven vessels before others are awake to their enormous benefits. Lord Pirrie has also requested Burmeister & Wain—the leading Danish motorship builders—to avoid publicity as much as possible. We cannot blame him for endeavoring to protect the splendid pioneer work that he has accomplished, but we see the trend of ship construction in Europe so are justified in saying to American shipowners, STOP—LOOK—LISTEN!

BACK ON THE JOB ONCE MORE

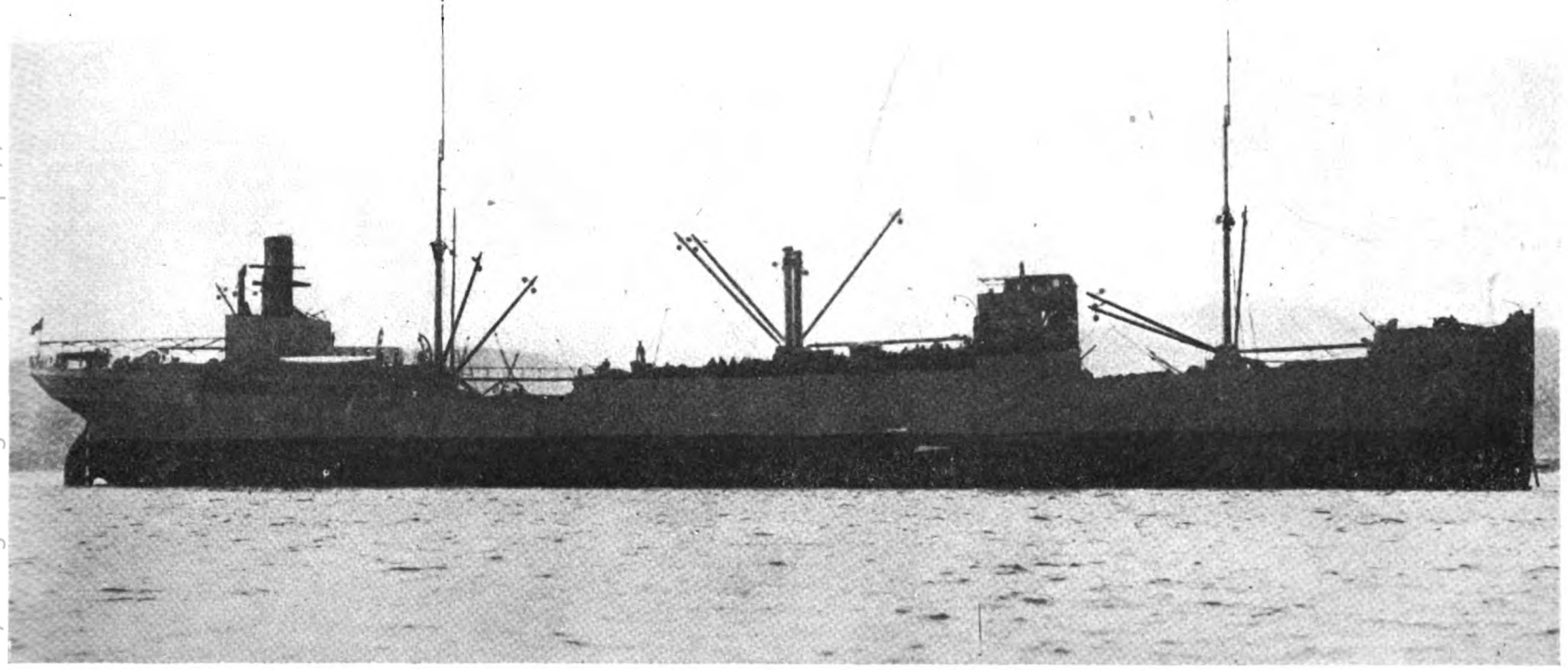
AFTER nearly four months in Europe, during which time we have had some very interesting—and often uncomfortable—experiences, we returned to America in time to put this issue to press. We have secured much information of interest which will be served to our readers as rapidly as space will permit, and some of these articles appear in the pages of this issue. Our trip took us through France, Switzerland, England, Scotland, Norway, Sweden, Denmark and Holland, and our only regret is that pressure on time caused by traveling delays prevented us from visiting Italy, where much motorship and Diesel-engine work is in progress. It was very gratifying to ourselves that everywhere we went "Motorship" had long preceded us, illustrating how widely this publication is read abroad—as well as in the U. S. A.—which will assist this country's export trade. We take the opportunity to express our thanks to the Acting-Editor and the staff of "Motorship" for so ably handling the editorial work during our absence.

OUR SPECIAL EUROPEAN ISSUE

Regardless of the difficulties caused by the printers' strike, this issue of "Motorship" has been enlarged in order to give our readers a comprehensive idea of what is going on in the way of motorship and marine heavy-oil internal-combustion engine construction in Europe. During our trip abroad we were enabled to obtain valuable details and illustations of other oil-engine and motorship construction, which we shall publish in subsequent issues; but, the contents of this number alone should be more than sufficient to impress upon Congress, the U. S. Shipping Board and upon private American shipowners the great importance of encouraging rapid construction of similar or better motorships in this country. Already British shipping interests are mildly amused at our attempts to establish a merchant marine, and if we delay much longer before we start an extensive motorship program their amusement will be justified.

SHIP-SPEED AND ECONOMICAL OPERATION

Generally speaking, the tendency on the part of shipowners when ordering motorships for the first time is to arrange for them to operate at similar speeds to their steamships, instead of taking complete advantage of the economy of the marine heavy-oil internal-combustion engine, which enables much higher ship speeds to be made without going beyond the bounds of economic operation. This fact was discussed within limits by Mr. Shaw of the Wm. Cramp & Son Ship & Engine Co. in the March issue of "Motorship," but it is possible to go even more



The Motorship "Ansaldo-San Giorgio I." She is the First of a New Italian Fleet of Standardized 8100 Tons d.w.c. Motorships, of Which Not Less Than 18 will be Launched Every Year at Spezia, Italy. Already Three Have Been Placed in Service and They are Fitted With Twin 1100 h.p. Ansaldo San Giorgio Two-Cycle Type Diesel Oil Engines

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

broadly into this question, and to build and place into successful service cargo-carrying motorships with speeds far beyond commercial-practicability with average steamers. It is understood that higher engine powers make the first cost of such vessels greater, but this expense does not come in proportion to the total first-cost of the ship because the increase relates only to the machinery, as the rest of the hull and equipment remain the same as with slower speeds. But, with *steamers,* whether oil or coal burning, high speed for freight trade is prohibitive under ordinary conditions, while the direct opposite is the case with the Diesel motorship. To render this in compact form we give a little table of approximate comparisons between a Diesel-engined motorship, an oil-fired geared-turbine steamer, and a coal-burning reciprocating-engined ship. The average fuel-consumptions of these are 0.30 lb., 1.01 lb. and 1.55 lb. per I.H.P. hour respectively, but in actual practice all will slightly vary from this, but not sufficiently to have any particular bearing upon the results of the ships in service.

CARGO VESSELS of about 14,000 tons loaded displacement.
(With Average Block Co-efficient.)

Loaded speeds*	11 knots	12 knots	14 knots	16 knots
Indicated horse-power	3,000	4,000	6,500	9,000
	Daily Fuel Consumption.			
Diesel motorship	9¼ tons	12¾ tons	20¾ tons	29 tons
Turbine oil-fired vessel	32 tons	42¾ tons	70 tons	96¼ tons
Reciprocating coal-burner	49¾ tons	66¼ tons	107¾ tons	149½ tons

*The speeds refer to what the vessels should average over about a year's period including heavy winter weather.

Without counting port-consumption (which in a large Diesel vessel is under one ton per day), the 16-knot oil-fired geared-turbine *steamer* would not be a commercial economic as, for a round voyage from say, New York-Stockholm-New York (10 days each way) she would burn about 1,920 tons of crude-oil, whereas the 16-knot motorship would only use approximately 580 tons of fuel. Hence the motorship will have ample room for cargo, whereas the cargo-space of a 16-knot steamer would be seriously encroached upon by the bunker-oil.

In these days of prolonged port delays it is up to the shipowner to save as much time at sea as is consistent with economical operation, in order that the ship shall make as many voyages as possible during each twelve months' period. Therefore, since labor troubles and harbor congestion make it exceedingly difficult to save time in port, *a 16-knot cargo motorship would be a very desirable unit of a shipowner's fleet, especially as she will use less fuel at sea than a 11-knot oil-fired steamer of the latest geared-turbine type,* and because when in harbor her consumption is practically nil. Furthermore, the extra speed may often enable her to get a discharging berth ahead of a dozen slower ships that might have sailed for the same destination several days before, and which otherwise would have been entitled to priority in discharging their cargoes.

Fuel-Costs Per 10 Days Voyage of 16-Knot Ships.
(Coal = $6.50 per ton. Crude-oil = $10.50 per ton.
Diesel fuel-oil = $15.00 per ton.)

Diesel Motorship	$ 4,350.00
Turbine Oil-fired Vessel	$10,082.60
Reciprocating Coal-Burner	$ 9,720.00

It will be at once seen that a fast coal-burning ship would have to bunker about 1,500 tons of coal each *one-way* voyage, while the oil-fired turbine boat would have to bunker approximately 2,000 tons each *round* voyage. Whereas, if the motorship bunkered 1,000 tons each *round* voyage she could discharge nearly 400 tons of fuel as cargo and still carry over 1,000 tons more general cargo than the 16-knot oil-fired steamer. As Diesel engines of sufficient power can be built today, this question of fast motor freighters has many feasible possibilities, and we suggest that shipowners pay a little more than ordinary attention to the figures in this foregoing table, which more or less speak for themselves. We believe that in this question we have brought up a new line of thought and we will be glad to throw open our columns to bona-fide shipowners, naval-architects, engine-builders, and shipbuilders for a thorough discussion of the subject. It forecasts a new era in ocean shipping!

THE PRINTERS' STRIKE

Owing to the New York printers' "strike" this number of "MOTORSHIP" is being published considerably later than the usual date of issue and has had to be printed in Cincinnati. As the situation has been beyond our control, we trust our readers will forbear with us. The December issue will be published about the 10th of December and the January issue between January 5th and January 10th. After that on the regular publishing date.

NEW CONSTRUCTION NOTES

MOTORSHIPS FROM THE GULF COAST

At the yard of the Henderson Shipbuilding Co., Mobile, Ala., an 850 tons steel motorship, named 'Mola," is under construction.

JAPAN AND MOTORSHIPS

Because Japanese shipowners are considering the building of a large fleet of motorships, Mr. K. K. Tanaka, chief engineer of the Asano Shipbuilding Company, is studying motorship and Diesel engine construction.

ANOTHER MOTORSHIP FOR THE GLEN LINE

The twin-screw motorship "Glenluce," which forms the ninth large motorship of the Glen Line's fleet, was launched on September 25th last at Harland & Wolff's Goven shipyard. She has a gross tonnage of 6,800 tons and is 420 feet long by 54 feet beam and her Diesel engines were built at their Glasgow works. As in the case of the other Glen Line motorships, the steering-gear, winches, windlasses, etc., will be electrically operated. The "Glenluce" will be employed in the Eastern trade.

FEDERAL SHIPBUILDING COMPANY MAY CONSTRUCT 4,000 H. P. MOTORSHIP

It is rumored that an order for two 2,000 i.h.p. McIntosh & Seymour marine Diesel engines has been placed by the Federal Shipbuilding Company for installation in one of the hulls building at their yard in Newark, N. J. No official confirmation of this has been received by us.

AMERICA'S LARGEST MOTORSHIP BUILDING

We understand that now in the early stages of construction, at the Bethlehem Shipbuilding Company's Fore River plant, there is a large steel single-screw motor propelled ore-carrier.

The Bethlehem Steel Company, of South Bethlehem, Pa., will install a 3,500 i.h.p. two-cycle Diesel engine in this vessel, which is intended for the ore trade on the Great Lakes and will be about 490 feet long, with 57 feet, breadth and 37 feet deapth. It is probably that the engine will run at about 100 r.p.m. and should produce a speed of about 10 knots. For auxiliary power there will be two 150 h.p. direct-connected Diesel-electric generators. If this vessel is successful, a fleet of twenty motorships probably will be built by the Bethlehem Shipbuilding Company.

It is not very widely known that for over a year the Bethlehem Steel Company have been running tests on a six-cylinder direct-reversible, two-cycle type marine Diesel engine, 25½ in. bore by 48 in. stroke, turning at 105 r.p.m. This engine develops 2,500 shaft h.p. on a weight of 350 tons.

LARGE MOTOR LINERS TO BE BUILT AT BELFAST

It is reported that Harland & Wolff are erecting big Diesel-engine works at Belfast, Ireland, for the purpose of constructing the oil-engine machinery of large passenger motorships. This is in addition to recent extensions of their Glasgow Diesel-engine works.

AMERICAN COMPANY TO BUILD MORE SHIPS

The Grace Steamship Company, owned by W. R. Grace & Co., the well known merchants and exporters of New York, are to add to their present fleet of 13 freight vessels, which includes several motorships. Altogether they will spend about $10,000,000. Bonds have been issued in order to provide funds.

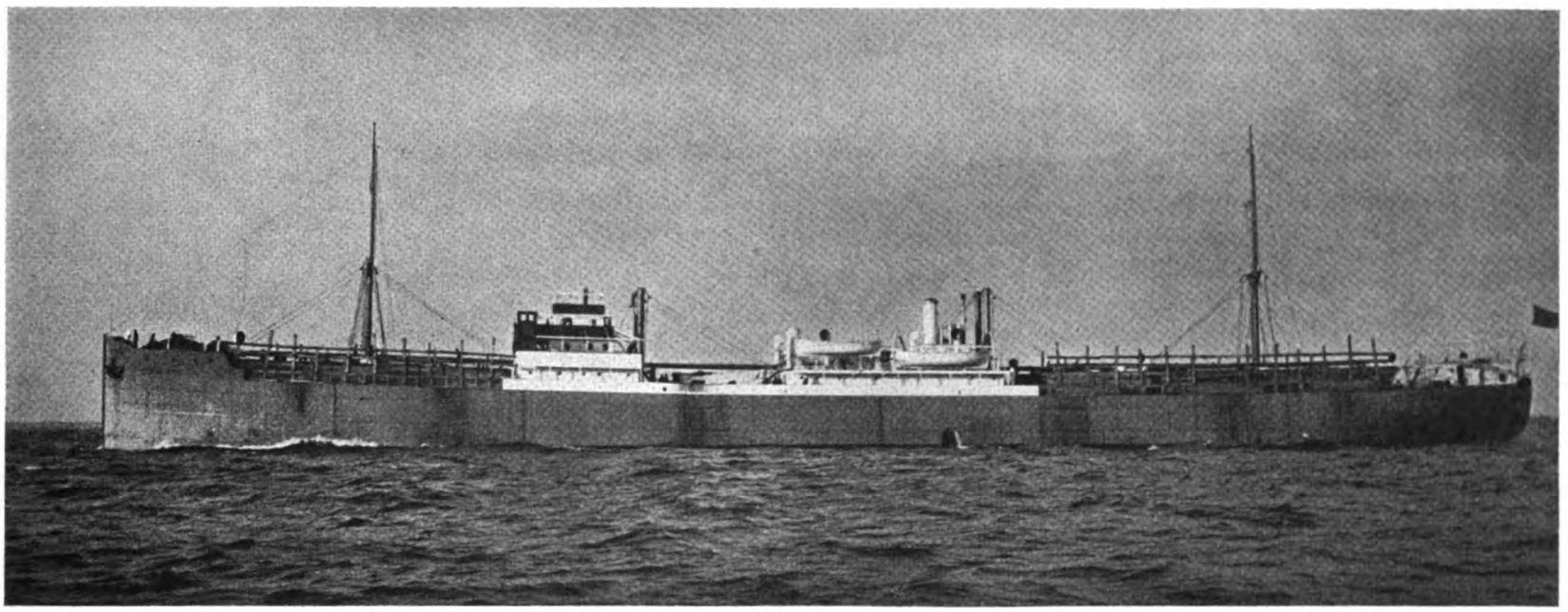
U. S. SHIPPING BOARD MAY BUILD 1,000,000 TONS OF SHIPS

Chairman Payne and Commissioner Scott, of the U. S. Shipping Board recently advised the Merchant Marine Committee of the House of Representatives that approximately 1,000,000 tons d.w.c. of merchant ships, including tankers and 10,000 tons cargo vessels should be built by the Shipping Board to balance the Government's existing fleet. Let us hope that Congress will only grant the money for these vessels on condition that they are to be motorships of the latest type, otherwise it will be throwing good money after bad.

YARROWS AND MOTORSHIPS

To replace naval ship work in their yard at Scotstown, near Glasgow, Messrs. Yarrow & Co., Ltd., have announced that they have made necessary arrangements to built merchant ships up to 5,000 tons d.w.c, propelled either by oil-engines, geared-turbines or reciprocating engines built at their works.

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



The 9400 Tons Motorship "Tisnaren" Which on Her Maiden Voyage Covered 23,887 Miles At 11.5 Knots Average Speed. She Was Built for the Rederi, Transatlantic By the Götaverken of Göteborg. She is a Splendid Example of a Modern Cargo Carrier. On This Voyage She Used Less Than 7,500 bbls. of Fuel Oil. Why Hasn't America a Single Similar Ship?

Motorships For Five Scandinavian Shipowning Companies Building at Goteborg

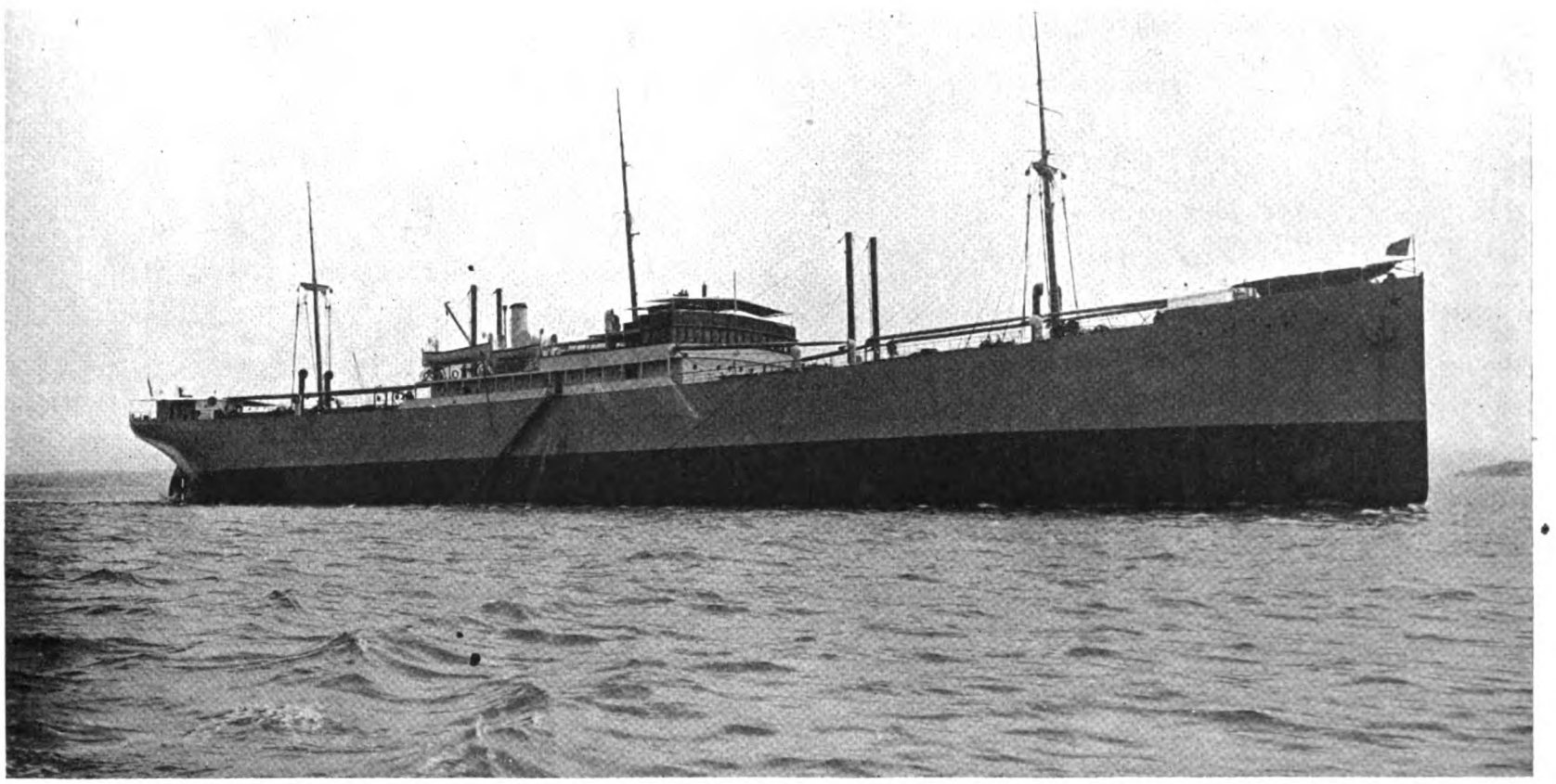
Nine Large Diesel-Engined Vessels Contracted With the "Gotaverken" and Options Taken for Seven More

By the Editor of "Motorship."

Göteborg, September 23rd, 1919.

If any day in our life produced impressions which left us convinced as to the importance of oil-engined motorships in the world's maritime commerce, to-day is that day, and we venture to say that if any "nailed-to-the-mast, Diesel-prejudiced, stick-to-steam-at-all-costs" American steamship owner—and there still are some left—had been with us, his first act upon returning to his hotel would be to cable to some home shipyard to get ready to contract for every Diesel-engined vessel that they could construct, or perhaps in his enthusiasm he would have gone a step further and have endeavored to have placed orders right in this vicinity, where motorship building has become a very important industry.

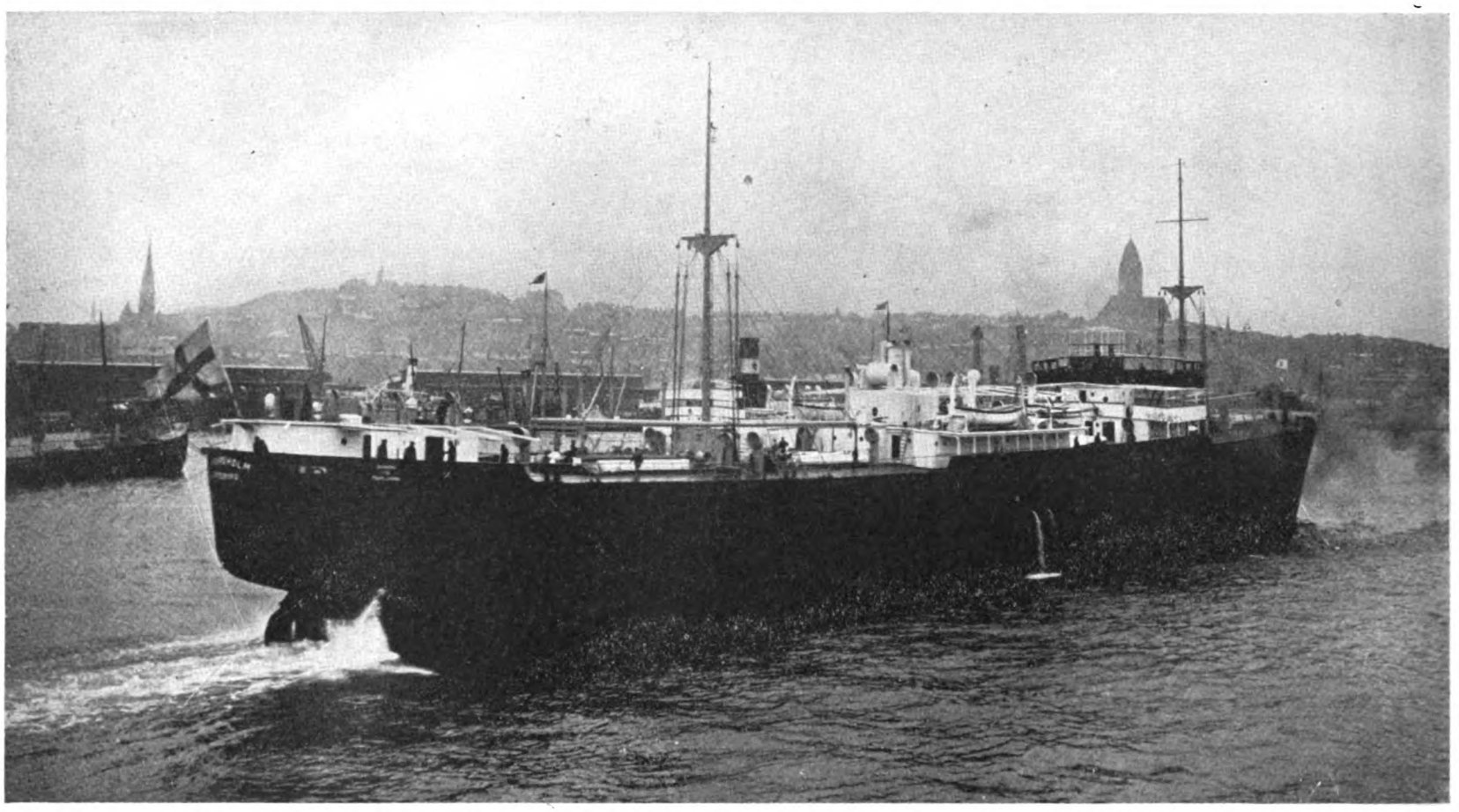
After having passed the morning in the "Götaverken" shipyard where many motorships are under construction or contracted for, we spent the afternoon increasing our knowledge in the company of Swedish motorship owners whose experiences have made them such strong believers in oil-engined vessels that in addition to having contracted for six large new motorships, they have arranged to convert one of their steamships to Diesel power—and if this proves as successful as anticipated, they will convert the other 35 units of their steamship fleet. While, at



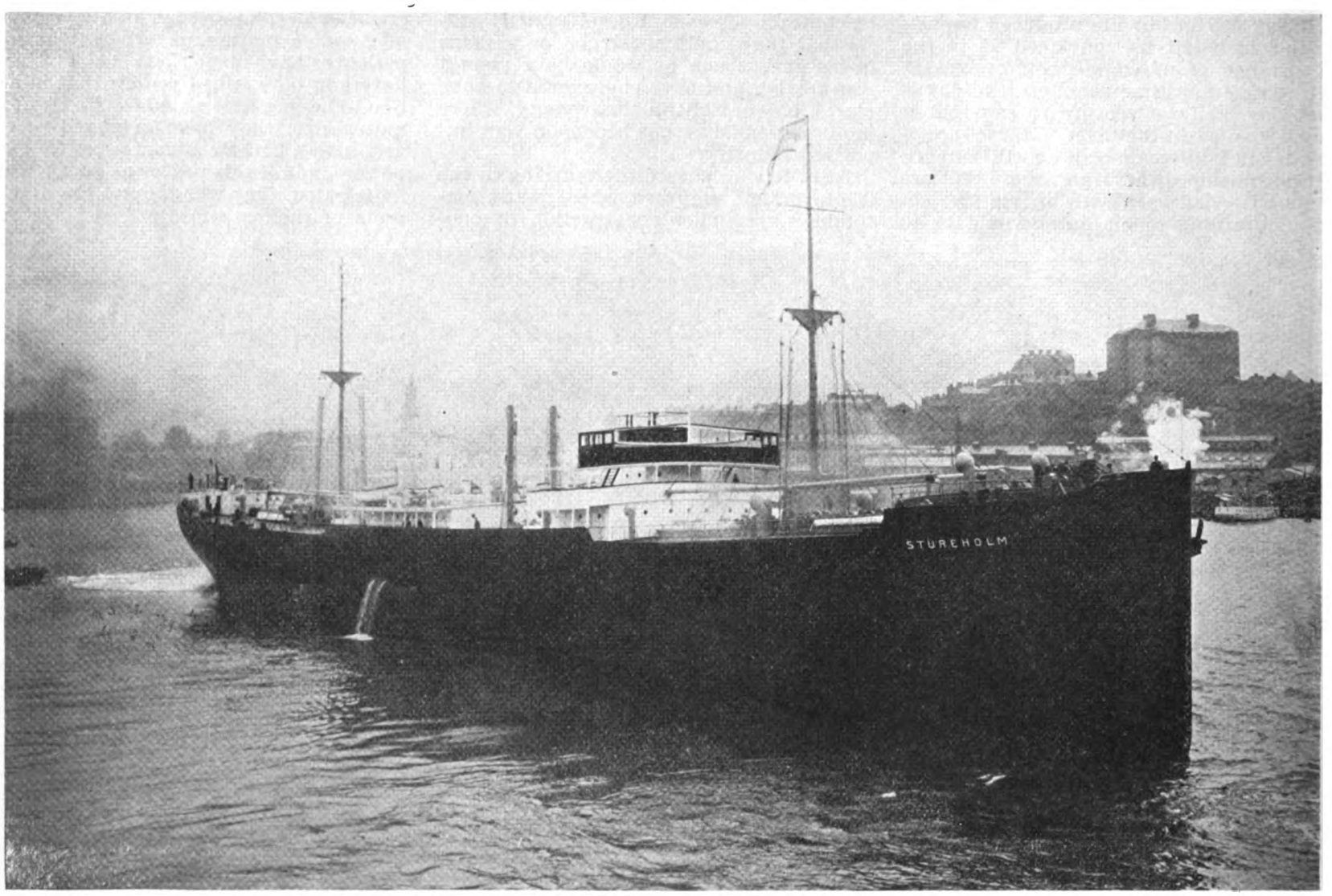
The New 9400 Tons d.w.c. Motorship "Balboa," Built by The Götaverken For The Johnson Line. She is a Sistership to the m. s. "Buenos Aires," which was launched September 24, 1919. These Economical Foreign Diesel-Engined Vessels Daily Visit Our Harbors and Carry Away Cargoes of American Products, But American Shipowners Are "Too Busy" To Visit Them And See For Themselves. Yet Seeing Is Believing!

Generated on 2024-09-13 14:16 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Sweden's Latest Motorships

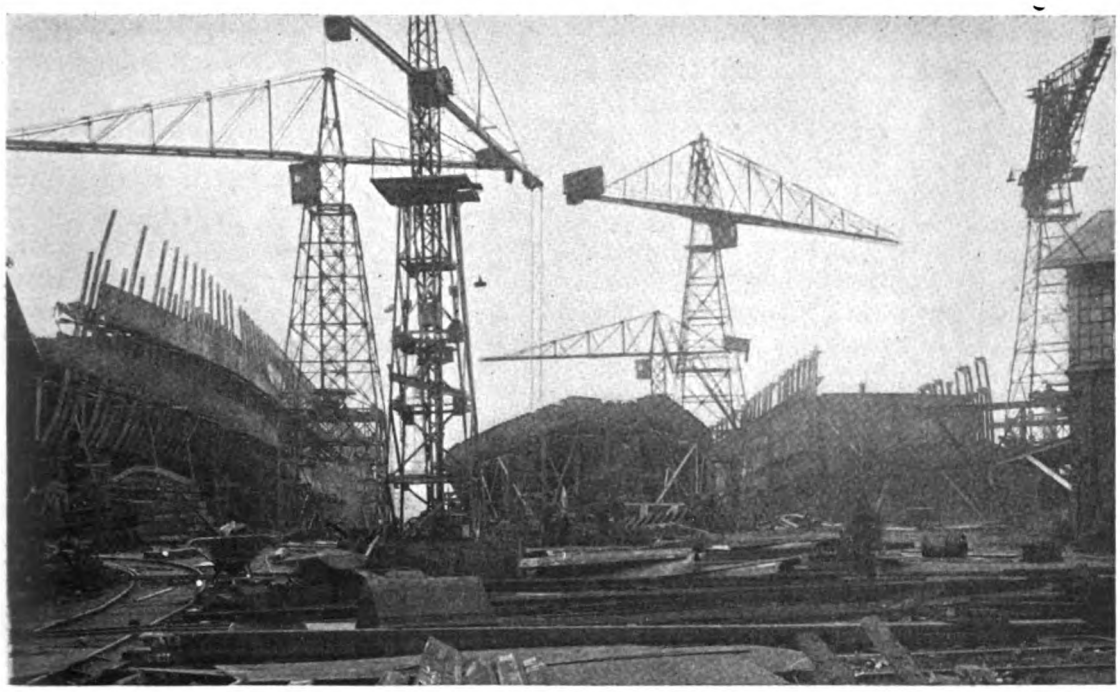


The 7,800 tons d.w. motorship "Stureholm" leaving the Götaverken yard prior to loading for her maiden voyage. She averaged a speed of 11 knots to Baltimore, Md., U. S. A.



Another view of the fine motorship "Stureholm" of the Swedish-American-Mexican Line. She is the latest vessel completed by the Götaverken, although the "Buenos Aires" has since been launched. Mr. John Donald, Commissioner of the U. S. Shipping Board, was a very interested vistor to this ship and his inspection made him an enthusiastic motorship convert. But, not one of the Shipping Board's steamers could compete against the "Stureholm" even were the crew's wage scales the same!

Generated on 2024-09-13 14:24 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



Three of the Building Ships at The Götaverken Motorship Building Yard

midday, we had the pleasure of being a guest of the Götaverken at an interesting luncheon at the Grand Hotel.

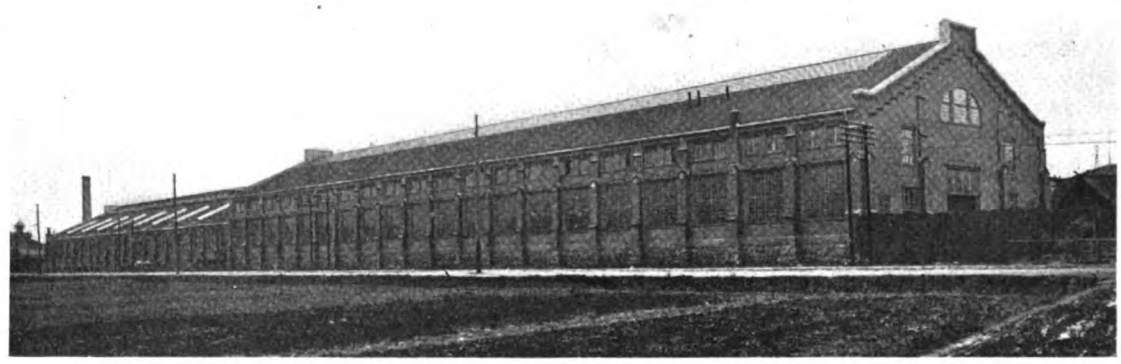
Among those present were Professor Abel, the Chief-Surveyor of the British Lloyds Registry of Shipping; Mr. Meyer and Mr. Ives, also of Lloyds; Mr. T. Madsen, Marine-Superintendent of the Rederiaktiebolaget Transatlantic; Mr. A. Borin, Director of the Swedish East Asiatic Co.; Mr. F. Lindahl, Marine-Superintendent of the Swedish-American-Mexican Line; (Aktiebolaget Broströms* Linjeagentur of Göteborg); Mr. V. C. Bülow, Resident Surveyor of the British Lloyds Registry of Shipping; Mr. Hugo Hammar, Director of Götaverken, and Mr. Ernest A. Hedén, Sub-Director of Götaverken. The party only one hour before the luncheon had come from the new Diesel motorship "Stureholm," 7,800 tons d.w. and 3,000 i.h.p., which after loading left on her maiden voyage to the U. S. A. The M/S "Stureholm" was built at the Götaverken shipyard for the Swedish-American Mexico line, and is illustrated in this issue.

It was at the Götaverken (Göta Shipyard) that the motorship "Bullaren" and her sister the "Tisnaren" were built. These, it may be remembered, are two fine vessels of 9,400 tons d.w., which at times have made over 13 knots speed. Also, the large Polar Diesel-engined tanker "Hamlet" was constructed here for the Nobel oil interests in Russia, who sold her to Norwegian owners at a profit of over three million kroner. The Johnson Line motorship "Balboa," of 9,400 tons d.w., was also built here. Better ships than the "Bullaren," "Tisnaren" and "Stureholm" could not be found today, for the design and structural work throughout is most excellent. We are not prone to praise, but we feel that in the present instance credit is due not only to the builders but to the owners for letting the builder properly finish the structural work regardless of the high cost of labor and materials existing at the present time.

One of the strongest supporters of the modern internal-combustion engined ship is to be found in the firm that own the "Bullaren" and Tisnaren," namely the Rederiaktiebolaget Transatlantic of Göteborg, and this is the firm first referred to as having contracted or have options for six more Diesel-driven vessels to be delivered before the end of 1924, and who are the first to commence the conversion of their extensive steamship fleet to motorpower.

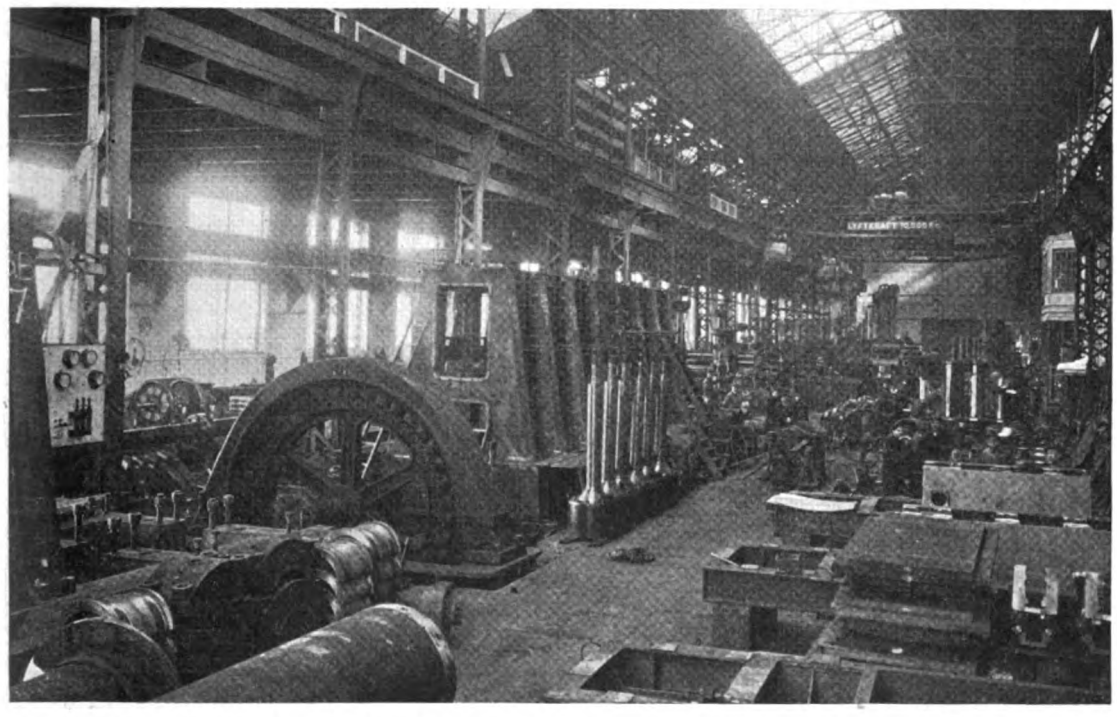
Five of these new ships will be freighters of 9,400 tons d.w. and of 4,000 i.h.p., with a speed of 12½ knots, and the sixth —which will be the next ship launched— is to be a tanker of 7,500 tons d.w. The primary purpose for which the latter vessel is intended is to ensure a regular supply of fuel-oil for the company's motorship fleet. But, as a matter of fact, it is hardly likely that she will be used for this purpose, but rather her cargo will be sold to other shipowners and for general consumption in Sweden, as each of their cargo motorships can deliver about 400 or 500 tons of bunker-oil and still have enough left to return across the ocean to some port where oil is comparatively cheap. Such a procedure, of course, would not be possible in the case of their steamships even were they oil-fired instead of coal-burning, and is only rendered feasible by the remarkable economy of the Diesel oil engine. Very probably the Rederiaktiebolaget "Transatlantic" will soon order five additional motorships from this yard.

Two motorships have been contracted for at this yard by the Rederi-Aktiebolaget Nordstjernan (Johnson Line) of Stockholm and these will be 9,400 tons and of 3,100 i.h.p. These are in addition to the 9,400-ton motorship "Balboa," recently completed for the same concern, who also have four 6,550-ton d.w. motorships building at the Burmeister & Wain's shipyard in Copenhagen, Denmark. It will not be out of place in this article to give a list of



Exterior of The Götaverken Foundry and Machine Shop

*The well-known Swedish shipping man, Mr. Dan Brostrom, is chairman of the Board of Directors of Götaverken and "Stureholm's" owners.



Diesel Engine Erecting Shop at The Götaverken, Göteberg, Sweden. Note The Electric Brake For Testing

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

the Johnson Line motorships already in service. They are as follows:

M/S "Balboa"	3000 I.H.P.	9400 tons d.w.
M/S "Suecia"	2000 I.H.P.	6550 " "
M/S "Pedro Christopher-sen"	2000 I.H.P.	6550 " "
M/S "Kronprins Gustaf Adolf"	2000 I.H.P.	6550 " "
M/S "Kronprinsessan Margareta"	2000 I.H.P.	6550 " "
M/S "San Francisco"	2000 I.H.P.	6550 " "
M/S "Valparaiso"	2000 I.H.P.	6550 " "
M/S "Lima"	3000 I.H.P.	6500 " "

While we were at the Götaverken shipyard the 9,400-ton d.w.c. motorship "Buenos Aires" was launched. She is building to the order of the Nordstjernan Co. and is of 3,100 i.h.p. So, with the Diesel vessels first mentioned as being under construction, **this company has a motorship fleet built or building aggregating 124,600 tons deadweight capacity,** in addition to 16 steamers of from 750 tons to 7,500 tons d.w.

A new comer into the motorship owning world is the Trafikaktiebolaget Grängesberg-Oxelösund of Stockholm, better known as the Grängesberg Company. This is one of the largest concerns in Sweden, having a capital of Kr. 120,000,000.00, who own big ore mines in the north and central part of the country. For ore-carrying they have ordered a fleet of 18 ships from the Götaverken. Originally these vessels were to have been steam-driven, but now it is likely that only the first two will be steam-powered and these are of 7.500 tons d.w. The second pair of ships, each of 7,500 tons d.w., will be Diesel-driven, and both will have two six-cylinder four-cycle type Götaverken-B. & W. motors aggregating 2,600 i.h.p. If the remaining ships are Diesel-driven—as no doubt they will be—the Grängesberg Co. will soon own a splendid fleet of modern ore-carrying motorships. It is said that the Grängesberg also have six motorships on order in Denmark.

Another new entrant into the motorship-owning business is the Rederiaktiebolaget Svenska Lloyd of Göteborg (Swedish Lloyd Line) who are too well-known to need any introduction, owning 68 steamships of 700 to 5,260 tons d.w. Recently they ordered four motorships from the Götaverken, and it is rather interesting to see that these Diesel vessels are larger than any of their steamers, as all four will be of 7,000 tons deadweight.

Lastly we have Aktiebolaget Broströms Linjeagentur of Göteborg, who superintends the fleet of the A/B Svenska Ostasiatiska Kompaniet (Swedish East Asiatic Co.), who also have a motorship under construction. This vessel is of 9,500 tons d.w., and they also own the motorship "Svealand," built by the Södra Varvet of Stockholm and engined by the Atlas Diesels Motorer. She is a vessel of 1.600 tons deadweight and was illustrated in a recent issue of "Motorship."

So far we have said very little about the shipyard and engine works of the Götaverken, which employ about 2,500 men. So far there are only five berths and a big floating dry-dock, but they hope to extend the entire plant very shortly. This has not been possible during the war owing to the scarcity of materials. The foundry is already of large size, but is to be still further extended. In the machine shops one pair of 2,000 i.h.p. Diesel engines with their auxiliary Diesel engines are completed each second month. The engines are tested by means of one electric brake.

We already have given the results of the operation of the M/S "Bullaren," and we now are able to give the figures of the first round voyage of the M/S "Tisnaren," which the Götaverken also built and which at the time of writing has reported her position off Gibraltar on the return journey of her second trip over the same route.

Maiden Voyage of M/S "Tisnaren," 9,400 tons d.w.c., with Full Load, including Lumber on Deck.

Route.	Dist.	Time.	Fuel Consumption.	Average Speed.
Gothb.-Cape Town	7231 N.M.	622 H.	381.1 T.	11.5 K.
Cape Town-Durban	812 N.M.	71 H.	39.9 T.	11.4 K.
Durban-Batavia	4547 N.M.	395 H.	244.0 T.	11.5 K.
Batavia-Samarang	1751 N.M.	145 H.	70.3 T.	12.0 K.
Samarang-Gothen.	9536 N.M.	853 H.	525.4 T.	11.2 K.
Total	23887 N.M.	2086 H.	1261.2 T.	11.5 K.

N.M. = Nautical-Miles; H. = Hours; T. = Tons, and K. = Knots.

Diesel Motorships on Order at Götaverken.

Length	Breadth	Moulded Depth,	Displ.	D.W.	I.H.P.	Owners
425' 0"	56' 0"	38' 0"	13,480	9,350	3,100	Red-A/B. Nordstjernan of Stockholm.
425' 0"	56' 0"	38' 0"	13,480	9,400	4,000	Red-A/B. Transatlantic of Göteberg.
425' 0"	56' 0"	38' 0"	13,480	9,350	3,100	Red-A/B. Nordstjernan of Stockholm.
385' 0"	53' 9"	34' 3¼"	10,600	7,500	2,600	Red- Grangesberg Co. of Stockholm.
385' 0"	53' 9"	34' 3¼"	10,600	7,500	2,600	Red- Grangesberg Co. of Stockholm.
425' 0"	56' 0"	38' 0"	13,480	9,400	4,000	Red-A/B Broströms Line of Götesborg.
380' 0"	55' 0"	30' 0"	10,800	7,500	2,600	Red-A/B. Transatlantic of Göteborg.
381' 8"	53' 9"	33' 0"	10,250	7,000	2,600	Red-A/B. Svenska Lloyd of Göteborg.
381' 8"	53' 9"	33' 0"	10,250	7,000	2,600	Red-A/B. Svenska Lloyd of Göteborg.

Options have been secured from the Götaverken by Scandinavian shipowners for seven more motorships. The yard numbers of the above vessels are 349, 351, 353, 356, 357, 372, 373, 380, 381.

"The Götaverken has increased its capital by 33⅓ per cent to 8,800,000 kroner ($2,358.400.00). The present capitalization is four times that of three years ago, the capital having been increased by 2,200,000 kroner in each of the last three years."

The M.S. "Bullaren" Makes Good Showing

Covers 37,703 Sea-Miles at 11.03 Knots Average Speed; One Voyage of 5,843 Miles at 12.83 Knots. Earns 2,000,000 Kroner on Voyage from New York to Stockholm

Stockholm, September 20th, 1919.

Walking along the quay of this beautiful city we noticed a fine-looking motorship that seemed somewhat familiar, and upon closer inspection she turned out to be the Swedish vessel "Bullaren," which was described and illustrated in "Motorship" early this year after she had completed her maiden voyage to New York. We went aboard in order to renew our acquaintance and to ascertain how she is operating. We found that she has been maintaining her initial good showing. This, of course, while pleasing, is just what we expected and is of special interest because in a few days we shall be at the shipyard of her builders—the Götavergen of Göteborg, where other fine motorships are under construction.

Chief-Engineer Hansen has left this vessel and his first assistant, Mr. C. G. Johansson, has been chief since July last. The only mishap that has occurred is a crack in the water jacket of one of the three 90 b.h.p. auxiliary motors, which if we remember rightly were supplied directly from Copenhagen, and, not like the marine Diesel engines built at Göteborg. This crack was electrically welded, but opened up again alongside the weld. At present this new crack is prevented from spreading by tie rods and straps. The rods run fore and aft along the engine cylinders which are cast en-bloc and are kept in tension by nuts on the threaded ends. At the time of our visit this particular engine was running. However, as one of the three auxiliary engines is a spare, no delay has been caused by this minor trouble. The two 2,000 b.h.p. main Diesel engines have been running splendidly, as is indicated by the following extracts from her log:

Voyage.	Route.	Distance in Nautical Miles.	Average Speed in Knots.	Fuel Consumption in Bbls.
1st.	Göteborg to New York	4176	10.96	1,148
2nd.	New York to Göteborg	3849	10.45	....
3rd.	Göteborg to New York	3782	10.55	1,121
4th.	New York to Buenos Aires	5984	11.24	1,833
5th.	Buenos Aires to Bahia Blanca	585	11.93	145
6th.	Bahia Blanca to Göteborg	7392	9.99	2,166
7th.	Göteborg to New Orleans	5843	12.83	1,672
8th.	New Orleans to New York	1694	12.89	473
9th.	New York to Stockholm.	4397	11.21	1,321

On her recent voyage from New York to Stockholm this motorship earned kr. 2,-000,000 carrying American and South American products.

Seeing that the "Bullaren" can carry about 1,000 tons more cargo than any oil-fired or coal-burning steamer of her dimensions, it is a simple matter for shipowners to compare the above performance with the results made by their own steamships, and then form their own conclusions. Incidentally, we would recommend new readers to secure a copy of the issue of "Motorship" containing full particulars of this most interesting craft, for there is a great future for vessels of her type. It would be possible to double their horsepower and increase their speed to a little over 16 knots without increasing their daily fuel consumption to more than 25 tons. It would reduce their cargo-capacity by about 500 tons, but they still would have a greater cargo-capacity and a lower fuel-consumption than 11-knot steamers of the same size. Too few shipowners have realized this fact.

[Publishers Note.—The issues in which the "Bullaren" was described are sold out. There are no copies on hand of either the January or February issues in which the information and descriptive matter on the M.S. "Bullaren" appeared.]

Generated on 2024-09-13 14:15 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Nearly Half-a-Million Horse-Power in Marine Heavy-Oil Engines

Remarkable Output of Vickers, Ltd., and Their Licensees — Further Light on the Question of Solid-Injection of Fuel — Progress with the New Vickers Merchant-Marine "Diesel" Engine

England, Sept. 11th, 1919

IN our recent editorial on the question of solid-injection we indicated that we intended making further investigations into the system and its results and its possibilities, and during a recent visit to the naval construction works of Messrs. land, we were courteously extended every opportunity of seeing what this great engineering company has done in the way of marine heavy-oil engine construction and development.

During the war period tremendous progress has been made with the Vickers "Diesel" engine and its solid-injection system, as can in a measure be seen by comparing the various illustrations of the differenty types of engines. When we consider that there has been built about 240 twin and triple screw submarines for the British Navy alone, and that in nearly two hundred of them Vickers oil engines are installed, one can understand the value of these experiences for peace-ship production, because it requires more skill to produce a reliable high-speed Diesel motor than it does to build a slow-speed mercantile engine.

In our wanderings around the British Isles we learned that the various Vickers licensees—not counting those of other countries—built no fewer than nearly one hundred engines of 1,200 b.h.p., and over eighty engines of 800 b.h.p., without reckoning the very large number constructed by Vickers themselves, so that altogether nearly 500,000 shaft h.p. in Vickers marine "Diesel" engines are in service or on order. Also, during our travels we managed to pick up the following names of firms that had been building Vickers marine "Diesel" engines under license during the war. Twenty important companies are represented in this list, which we will not guarantee as being complete, as there may be other companies. However, we believe that none of these companies have constructed less than 1,600 shaft h.p., and one firm aggregated as much as 20,000 shaft h.p.

LICENSEES

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.
W. H. Allen & Son, Bedford.
The British Westinghouse Co., Ltd., Trafford Park, Manchester.
Belliss & Morcom, Ltd., Birmingham.
J. Brown & Co., Ltd., Clydebank.
Crossley Bros. & Co., Ltd., Openshaw, Manchester.
Cammell, Laird & Co., Ltd., Birkenhead.
Frazer & Chalmers Engineering Works, Erith, Kent.
Fairfield Shipbuilding & Engineering Co., Govan, Glasgow.
Harland & Wolff, Ltd., Belfast, Ireland.
Hick, Hargreaves & Co., Ltd., Bolton.
Mirrless, Bickerton & Day, Ltd., Hazel Grove, Stockport.
Ruston & Hornsby, Ltd., Lincoln.
Swan Hunter & Wigham Richardson, Ltd., Walker-on-Tyne.
J. I. Thornycroft & Co., Ltd., Southampton.
G. & J. Weir, Ltd., Cathcart, Glasgow.
Willans & Robinson, Ltd., Rugby.
The Wallsend Slipway & Engineering Co., Ltd., Wallsend.
Yarrow & Co., Ltd., Scotstoun, Glasgow.
Wm. Beardmore & Co., Ltd., Dalmuir, Scotland.

Vickers are now turning their attention to the merchant-ship Diesel engine construction in a very active manner, and it is their intention to push this side of their business very vigorously, their plant being well suited for this class of engineering work, and, of course, they have their own shipyards, etc., they being one of the largest engineering and shipbuilding concerns in the British Isles. They have opened up offices in the Woolworth Building, New York, and are about to energetically push the sale in America of the Vickers-Diesel and Vickers-Petters surface-ignition types of marine oil-engines.

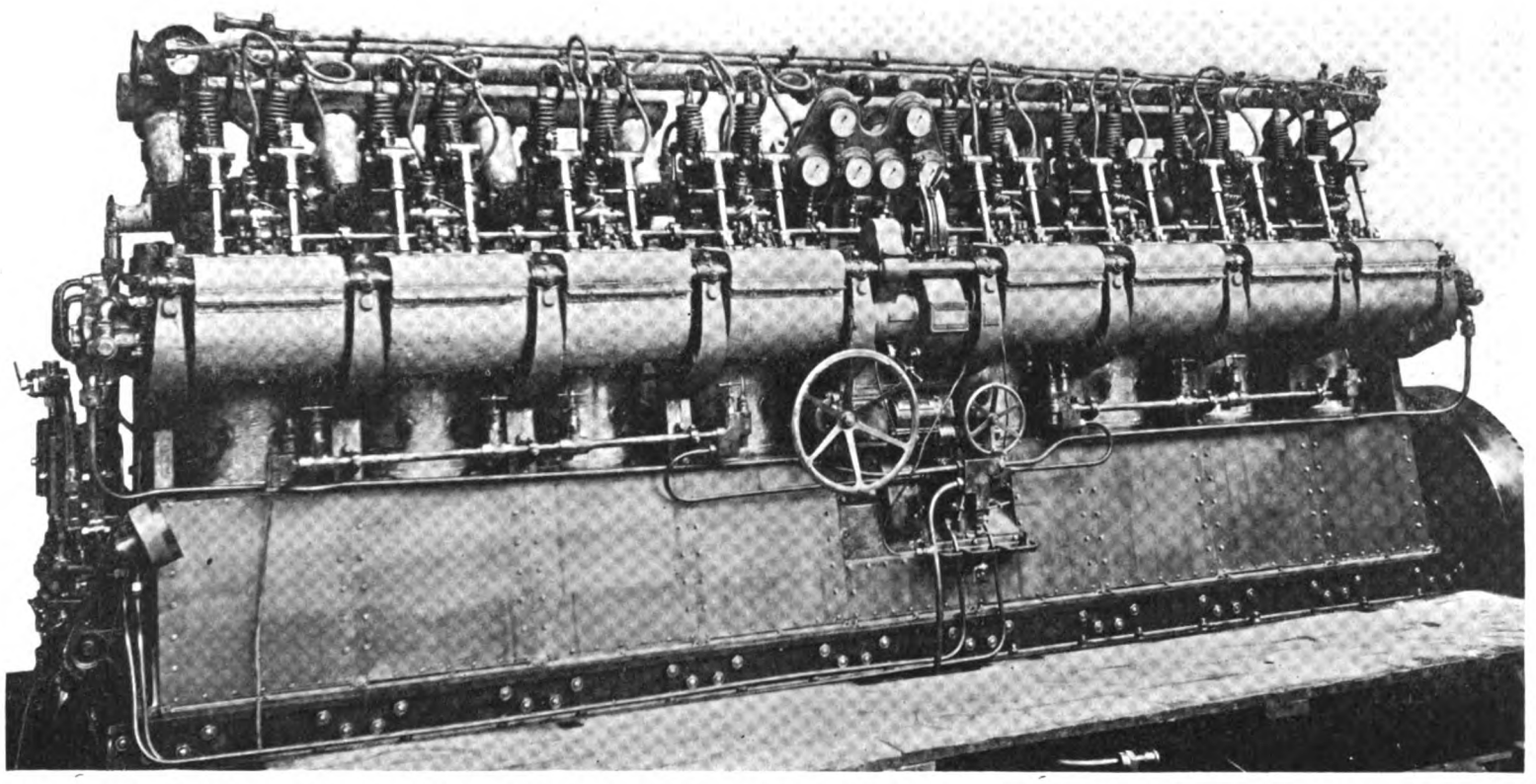


Fig. 1. One of 26 Vickers Diesel engines originally ordered by the Russian Admiralty for installation in large submarine chasers. Sixteen of these engines now are installed in eight large steel ships converted to motor power by the Anglo Saxon Petroleum Co. of London.

At present they have under construction two slow-speed Diesel engines of the solid-injection type of 1,250 shaft h.p. each, which are to be installed in a tankship for the Anglo-American Oil Company, which is the London branch of the Standard Oil Company. In size this vessel will be very similar to the motorship "Santa Margherita," illustrated in this issue of "Motorship," and described in the October, 1918, issue, but the engines will be of heavier design. The name of this new vessel will be the "Narraganset," replacing the steam-driven tanker lost during the war. Her engines will be six-cylinder, four-cycle models, 24½ in. bore by 39 in. stroke and will turn at 118 r.p.m. The M.E.P. will be 76 lbs. per sq. inch and the piston speed 767 ft. per minute.

The "Santa Margherita," by the way, is not owned, or operated by the Anglo-Saxon Petroleum Company, which, of course, is

Generated on 2024-09-13 14:19 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

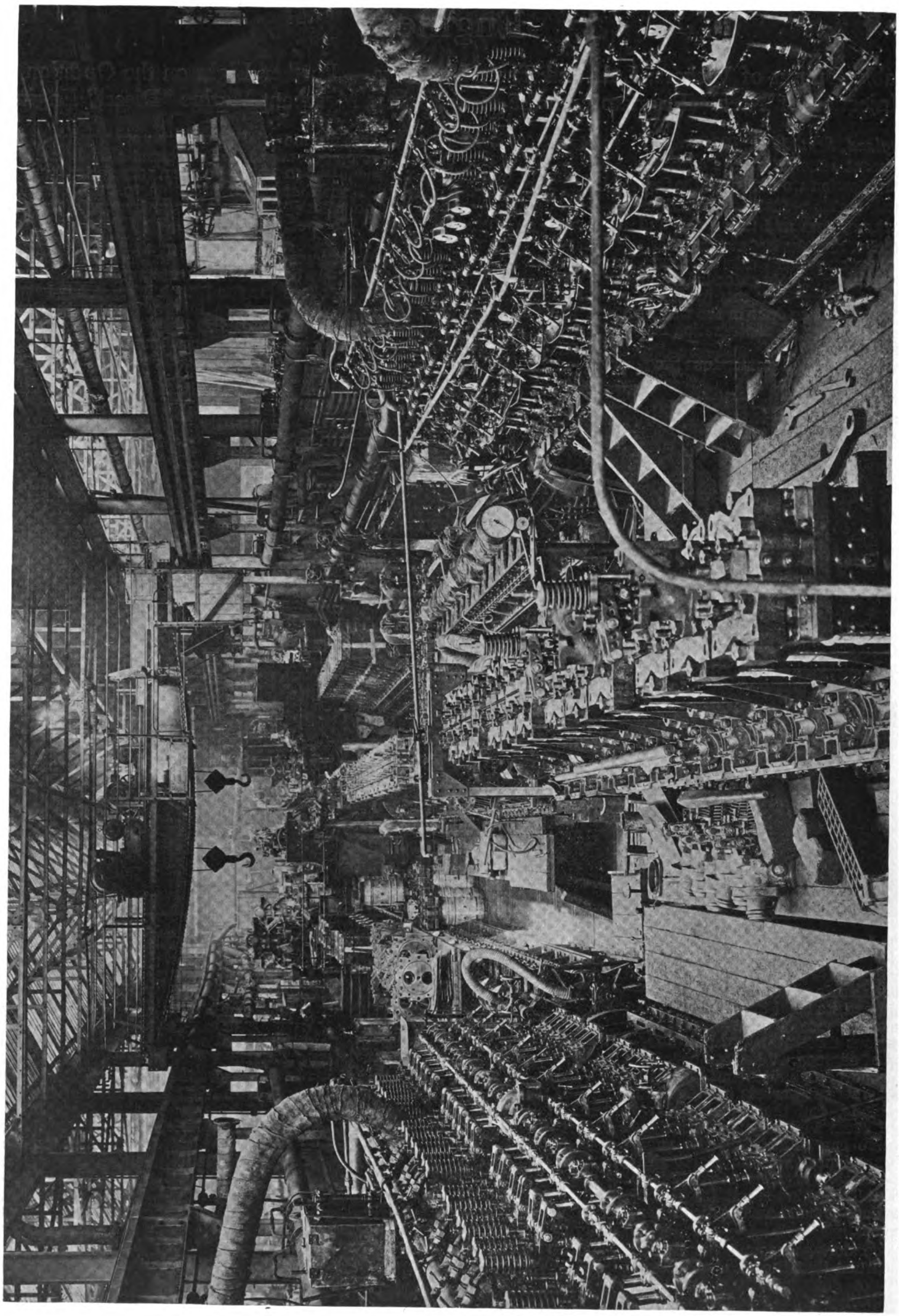


Fig. 2. View of one bay of the Diesel-engine shop at the Vickers-Barrow works. In the foreground are eight 1,200 B.H.P. engines, while six of 800 B.H.P. are in the pit at the far end of the shop. This shop is now being used for constructing merchant-marine Diesel engines.

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

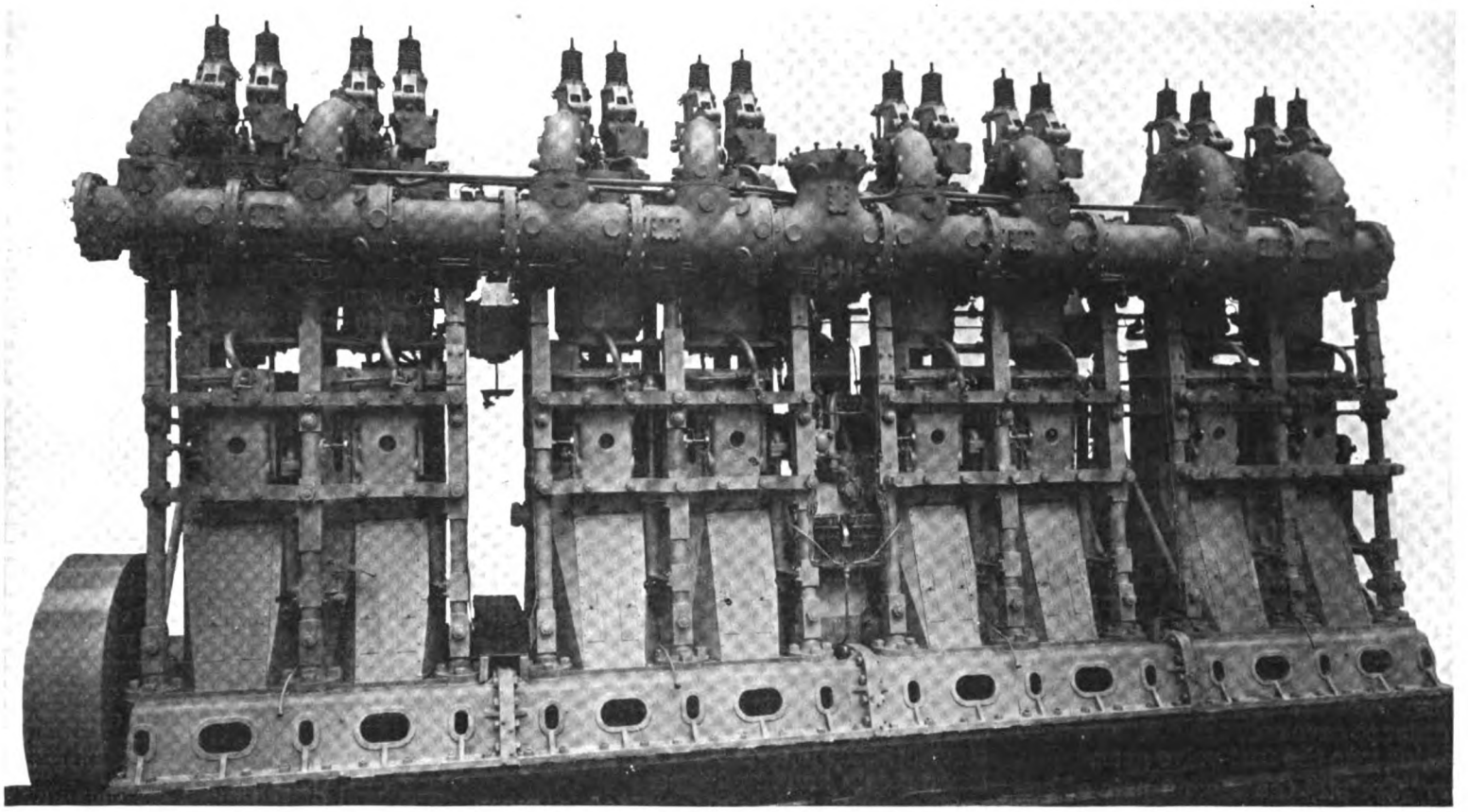


Fig. 3. Back view of one of the two 1,250 shaft H.P. Vickers solid injection Diesel engines of the M. S. "Santa Margherita" operated by the Anglo Saxon Petroleum Co., of London.

a subsidiary of the Royal Dutch-Shell combination, and which is the biggest rival to the Standard Oil Company, so must not be confused with the Anglo-American Oil Company. A little bit of mystery seems to be attached to this ship, as she originally was ordered for the British Admiralty under the name of "Olympia," and later had her name changed and was registered under the name of "Sir. Thos. Royden" of the Cunard Line. The British Admiralty incidentally are controllers of the Anglo-Persian Oil Company, which is associated with the Anglo-Saxon Petroleum Company, and the "Santa Margherita" has been engaged in the transporting of oil from the new Persian Gulf oil fields, to which we referred at length about a year ago. Incidentally, sixteen Vickers-Diesel engines out of twenty-six originally ordered by the Russian Admiralty for installation in submarine patrol vessels (similar to those proposed by "Motorship" about two years ago), were installed in eight twin-screw ships converted to motor power to the order of the Anglo-Saxon Petroleum Company. One of these engines is illustrated.

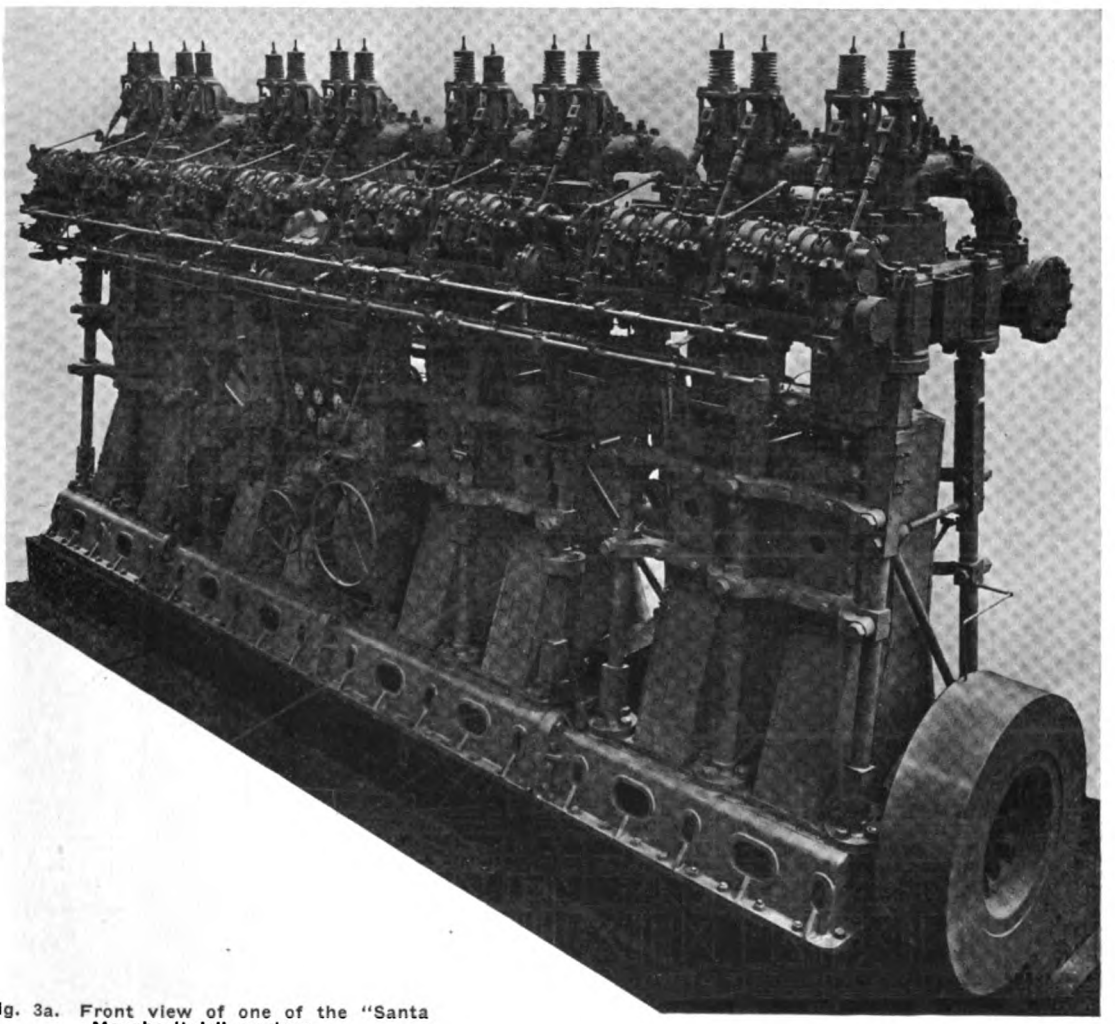


Fig. 3a. Front view of one of the "Santa Margherita's" engines.

The illustration (Figure 2) gives an excellent idea of the capacity of the Vickers naval Diesel engine constructing shops, which now are being used for merchant-ship Diesel engine work. In these shops the engines for the "Santa Margherita" were built.

It must not be thought that this represents the total Diesel engine experiences of Vickers, Ltd., because some time ago the Admiralty ordered some "cruiser" class engines, which were a compromise between the merchant-ship engine and the submarine-type engine. Two of these ultimately were installed in the monitor "Marshal Soult," a vessel of 6,770 tons displacement. Her length was 355 ft. 6 in., breadth 90 ft., and draught 10 ft. 6 in. These engines gave splendid service, and another pair was fitted in the Admiralty tanker "Trefoil." Incidentally the "Santa Margherita's" engines were originally intended for a cruiser, and were ordered by the Admiralty in order to gain experience with this type.

For the "Trefoil" two sets of 750 b.h.p. at 150 r.p.m. oil-engines were built, the first pair being diverted to the "Marshal Soult," in which vessel they generally worked with an overload under most difficult conditions. As a matter of fact, these two engines were designed to develop together 1,500 shaft h.p., but on trials in the ship were worked up to 1,900 shaft h.p., obviously beyond their designed capacity, and gave the buky monitor a speed of 6.6 knots, which, power for

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

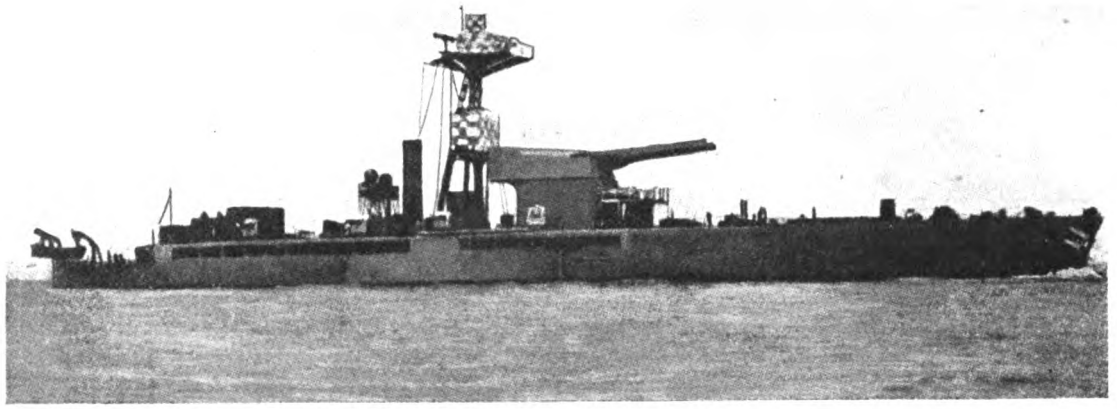


Fig. 4. The British motormonitor "Marshal Soult" propelled by two Vickers 1,000 I.H.P., solid-injection "Diesel" oil-engines.

power, was faster than some of the steam-driven ships of the same class. Yet, although these oil-engines were working under such severe conditions they proved themselves very reliable. One could reasonably expect they to develop many troubles under the circumstances, whereas the "Marshal Soult" accomplished some most consistent and reliable work. Replace engines then were ordered for the "Trefoil," and in order to save cost the columns were modified, as was the fuel-valve gear.

In the "Trefoil" the second pair of engines also made a splendid showing. In fact the ship was run on service so urgent that for eighteen months no bearing or cylinder was opened, apart from an occasional grinding-in of the fuel-injection valve, was one exhaust-valve for the purpose of easing the spindle. The fuel on which each of these engines develop 750 shaft h.p. (1,000 i.h.p) is Texas crude oil.

We will give a few details regarding the motorship "Trefoil," which is illustrated by Figures 5 and 6. She has, of course, the solid-injection system. She was designed and built at H. M. Dockyard, Pembroke, the principal dimensions being as follows:

Length, b.p.	280 ft. 2¾ in.
Breadth, moulded	39 ft.
Deadweight capacity	2390 tons
Depth, moulded, to upper deck	23 ft. 6 in.
Draught, normal	18 ft. 3 in.
Draught, maximum	20 ft. 3 in.
Displacement at above draught	4510 tons
Bunker capacity (oil)	213 tons
Speed at normal draught	11 knots
Shaft horse-power of main engines	1,500 h.p.

As shown on the drawing reproduced, the propelling machinery is situated aft. Immediately forward of the engine-room the boiler-room and pump-room are placed, separated by w.t. bulkheads. There are two sets of cargo-pumps of the reciprocating type, steam-driven, each capable of pumping 100 tons of oil per hour under ordinary working conditions.

Two water-tube boilers of the Yarrow type, having a working pressure of 210 lbs. per square inch, are provided for supplying steam to the auxiliaries, which, with the exception of the compressors for starting and maneuvering purposes, are all steam-driven, and for "steaming out" the tanks, and also far the ship's heating system and the fire extinguishing system. The steering-gear is of the twin-cylinder, combined steam and hand type.

The vessel on trial attained a mean speed of 11.29 knots as the mean of two runs on the measured mile. She is fitted with twin-screws, each being direct coupled to an eight-cylinder heavy-oil engine, having pistons 17 inches diameter by 27 stroke, and developing 750 b.h.p.; or, collectively, 1,500 b.h.p. (2,000 i.h.p) at a speed of 150 r.p.m.. The air for starting or maneuvering the main engines is supplied from two air-compressors having a maximum working pressure of 600 lbs. per square inch, although the engines will start up with as low a pressure of 145 lbs. per square inch. Each compressor is driven by a Vickers heavy-oil engine of 110 b.h.p., and a small steam-driven four-stage compressor is provided for starting purposes in emergencies.

One water-cooled silencer is fitted for the two main engines, and a separate silencer of the same type is provided for the two auxiliary engines. The silencers are fitted in a room arranged in the engine room at the main deck level, the exhaust being carried from each silencer separately through pipes attached to the after side of the funnel for the boilers.

The construction of the engines is plainly shown in the drawing attached (Fig. 7), the cylinder lines being supported in a steel entablature which rests upon two turned columns at the back of the engine, and a cast-iron single guide at the front of the crankcase being closed in with light steel guards. In the shop tests up to 900 shaft h.p. was developed. Fig. 7A shows the front of this engine.

In this cruiser design, the headroom did not permit the crankpit being closed at the top. In the mercantile designs now under construction, the headroom is slightly increased, and the piston-rod passes through a gland in the top casing of the crankpit. For the cylinder heads cast-steel is used with separate inlet and exhaust valve-boxes, thus following the submarine engine practice. The pistons are not water cooled, and consist of simple box-section iron castings, but the pistons of the new large engines are sea-water cooled.

The ship left Barrow on July 31st, 1917, and proceeded in fueling duties with the fleet, being always at short notice and constantly maneuvering. Between her delivery and her first refit in February, 1919, which was necessitated by the boilers giving trouble, the ship was under way on 283 days. The continuity of her operations is shown by the fact that in one intervale of three months she was running on 78 days. Although circumstances prevented an overhaul of the main engines during this first commission, they were found to be in good condition. When she put in for a refit her oil-engines were running perfectly, and the ship was soon underway once more, when the engines continued to give the utmost satisfaction, running on ordinary boiler-fuels, according to what ship she was taking to the fleet.

A few additional notes on the mechanical features of the "Trefoil's" engines will be of interest. The simplification of the engine will be a point that will appeal strongly to the sea-going engineer. The four fuel-pumps deliver into a common pipe for all the cylinders. From that pipe the spray-valves are fed, the regulation of the fuel injected being effected by adjusting the duration of opening of the spray-valves, the fuel pressure, in addition, being reduced at low power from 3,750 lbs. or so used at full speed.

As regards the method of reversing there is a special reversing shaft above the camshaft, which latter runs along the top of the cylinders and is driven by a vertical shaft through bevel or skew gears. This reversing shaft carries two rockers for each valve on eccentric fulcrums, so disposed with regard to each other that when one is engaged with its cam the other is clear, the two corresponding cams on the

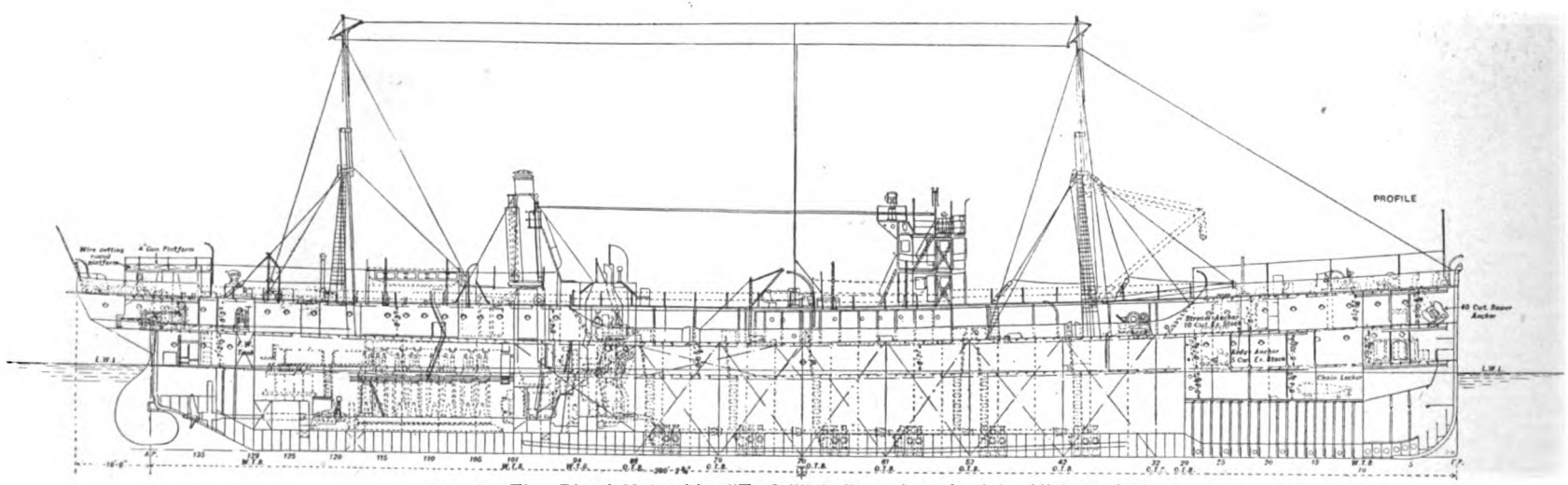


Fig. 5. The Diesel-Motorship "Trefoil" built and engined by Vickers, Ltd.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

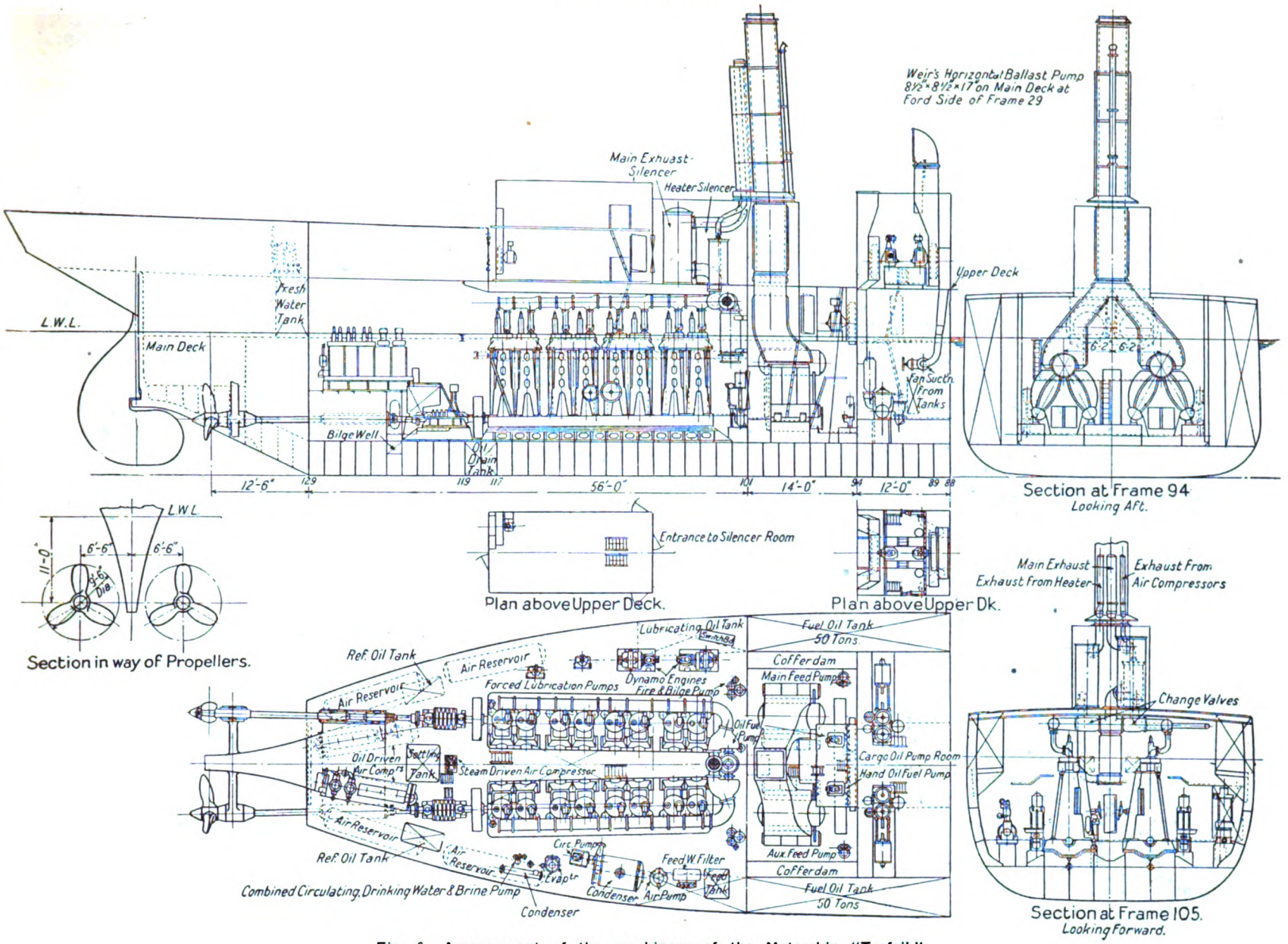


Fig. 6. Arrangement of the machinery of the Motorship "Trefoil."

camshaft being fixed on that shaft for ahead and astern going respectively. Thus a half turn of the reversing shaft puts the inlet and exhaust valves right for the intended direction of rotation, but the fuel-cam block, with its ahead and astern cams, has to slide along the shaft by means of a separate maneuvering shaft, and this can be done without the necessity of raising the rockers clear of the cams by reason of a slope on the side of the nose of the cams. Control of the period of fuel injection is obtained in a very simple way by the eccentric mounting of the fulcrum of the fuel-valve rocker.

When the cams are set in the proper position the master air-valve is opened and air delivered to four little cam-operated valves, which deliver the air through separate pipes to non-return valves in each cylinder-head, the valves and cams being on a vertical shaft and situated near the starting handles.

Considerable surprise was evinced when Messrs. Vickers recently announced that the consumption of their submarine type solid-injection oil-engines had been reduced to 0.38 lb. per b.h.p., or equivalent to 0.28 lb. per i.h.p We may say that we were enabled to satisfy ourselves at the time of our visit that these consumptions are accurate, not merely with a single test, but with a series of tests with a dozen or more different engines, and in some cases the consumption was below 0.38 lb. per shaft h.p. This, by the way, was on a heavy kerosene oil known as Broxburne, but the makers claim that on heavier fuels even better results should be obtained.

The following are examples of official tests made with an engine of this type:

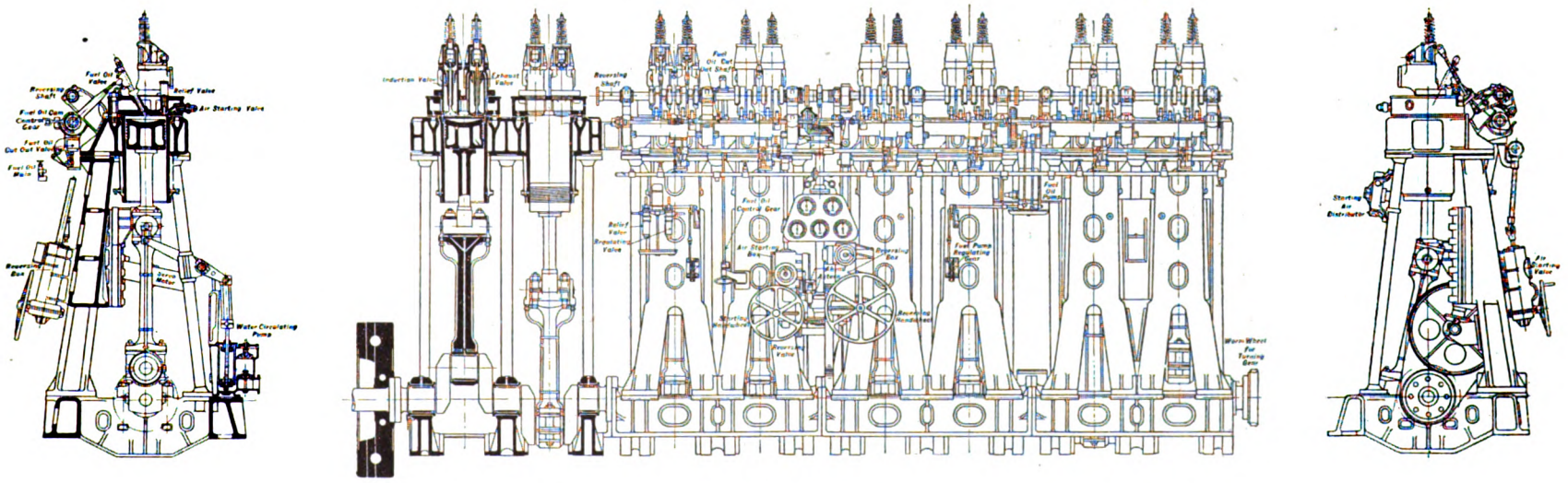


Fig. 7. Section and General Arrangement of the Vickers engines of the M. S. "Trefoil."

Generated on 2024-09-13 14:23 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

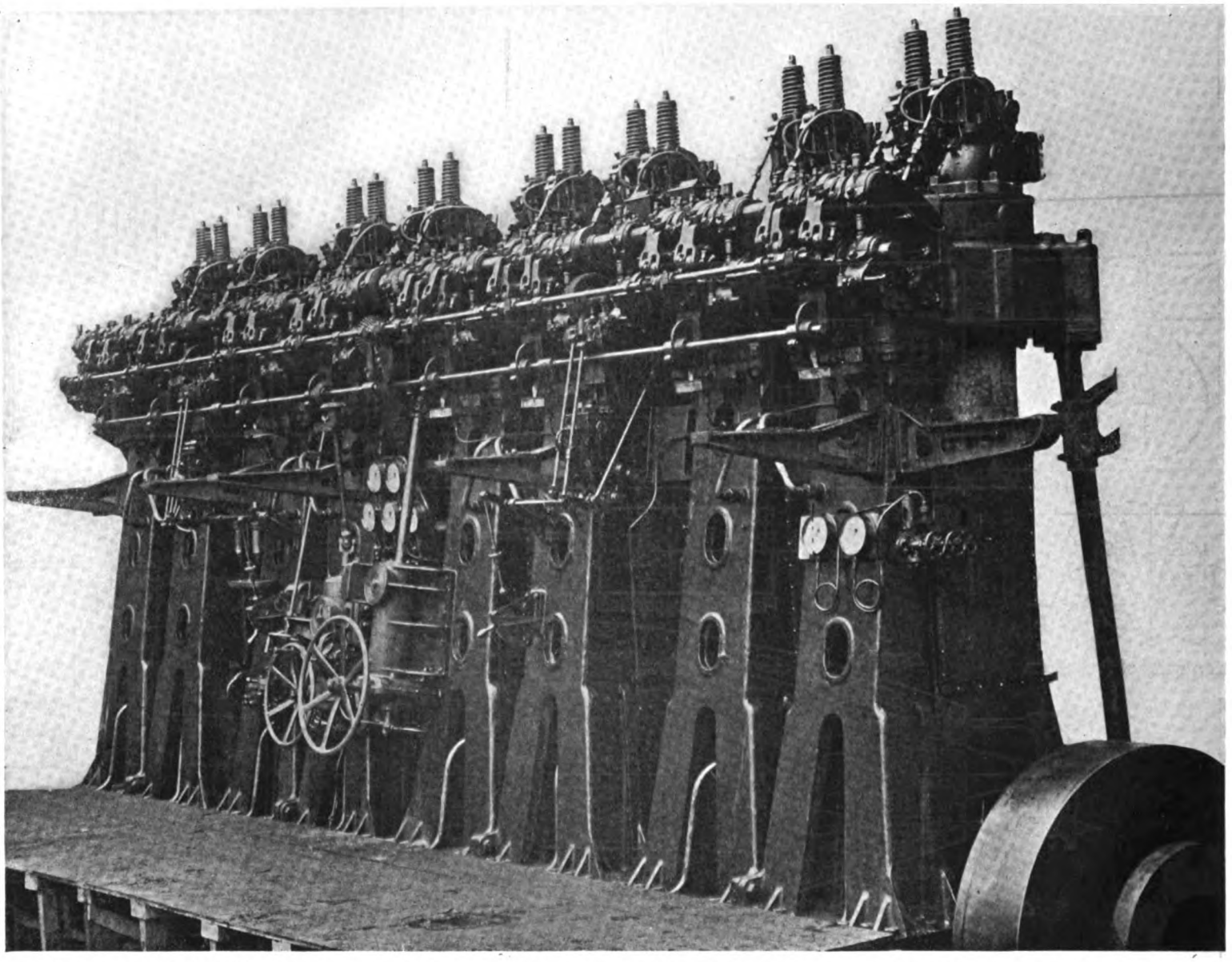


Fig. 7a. One of the 1,000 I.H.P. Vickers engines installed in the motor tanker "Trefoil." It is a modification of the cruiser engines in the monitor "Marshal Soult."

SIX HOURS' OFFICIAL SHOP TRIAL OF SUBMARINE ENGINE 1,200 B.H.P.

Time.	R.P.M.	B.H.P	Fuel Used.		Fuel Pressure	Controls at		Circulating Water.	Lubricating Oil.			Atmosphere Temperature
			Lb. per Hour.	Lb. per B.H.P.-Hr		Fuel Pump.	Spray Valves.	Pressure.	Pressure	Temperature, Fahrenheit. In.	Temperature, Fahrenheit. Out.	
					lb. per sq. in.			lb. per sq. in.	lb. per sq. in.	deg.	deg.	deg.
1st hour	379 8	1,209.9	461	0.381	4,500	9	18.5	10	12	68	87	60
2nd hour	382.5	1,218.5	461	0.379	4,500	9	18.5	10	12	71	101	62
3rd hour	381.0	1,213.9	461	0.380	4,500	9	18.5	8	10	72	106	64
4th hour	381.8	1,216.3	457	0.376	4,500	9	18.5	8	8	87	109	62
5th hour	381.4	1,215.0	479	0.394	4,500	9	18.5	10	12	98	116	63
6th hour	381.7	1,216.0	461	0.380	4,500	9	18.5	10	12	104	114	63
Average	381.3	1,215.0	463	0.381	——	-	——	—	—	——	——	—

Indicated horse-power, 1520.

Inspecting Officer's Report: "The engine ran steadily and well, and no trouble of any sort was experienced throughout the trial The crank pits remained clear of gases, and the exhaust was light and good. The trial is considered satisfactory."

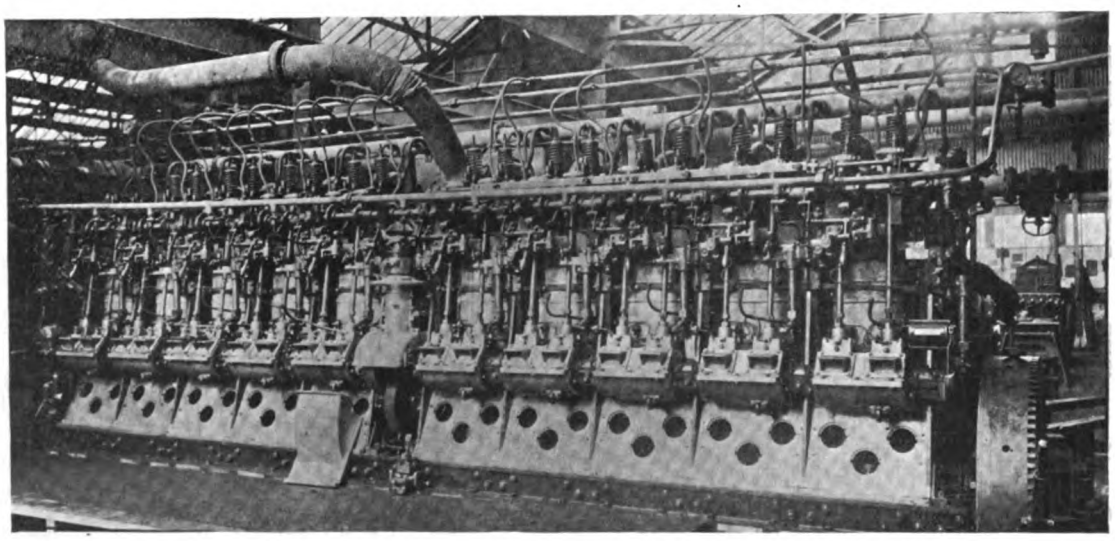


Fig. 8. One of the four Vickers 10-cylinder 1,000 B.H.P. Diesel engines of special design built for Russian submarines.

ENGINE NO. 521 PORT. OFFICIAL STARTING AND REVERSING TRIAL, APRIL 26, 1919

From.	To	Condition of Engine	Volume of Compressed Air in Use.	Air Pressure Before.	Air Pressure After	Air Pressure Difference.	Time to Start.	Revolutions to Start
			c. ft.	lb.	lb.	lb.	sec.	
Stop	Ahead	Cold	36 4	550	525	25	5	8 0
Stop	Ahead	Cold	36 4	525	510	15	3	4 0
Stop	Ahead	Cold	36 4	510	495	15	3	4 0
Stop	Ahead	Cold	36 4	495	485	10	3	4 0
Stop	Astern	Cold	36 4	480	465	15	2	3'0
Stop	Astern	Cold	36 4	465	450	15	2	2 5
Stop	Astern	Cold	36 4	450	440	10	2	2 5
Stop	Astern	Cold	36 4	440	425	15	2	2 5
Astern	Ahead	Slightly Warm.	36 4	400	380	20	15	—
Ahead	Astern	Slightly Warm.	36 4	380	365	15	16	—
Astern	Ahead	Slightly Warm.	36 4	365	355	10	16	—
Ahead	Astern	Slightly Warm.	36 4	355	345	10	15	—

Note.—Load condition as at full power

The fuel system was primed by hand for the first start to approximately 400 lb. pressure. This was not necessary for the subsequent starts, as there was sufficient residual pressure in the system. For reversing no hand priming was carried out.

Of the time taken to reverse the engine, from 13 seconds to 14 seconds were absorbed in hand manipulation of shutting off and opening the controls and actuating the reversing wheel. Number of turns of reversing wheel from full ahead to full astern equals 23

TABLE III.—*Engine No.* 518 *Port July* 3, 1918. *Air Starting Trial Arranged for Lloyds Surveyor*

Thirty-four starts were made, dropping the pressure from 450 lb to 195 lb. per square inch Volume of compressed air in use 37 5 cu. ft.

The engine was cold, not having been touched since the previous morning's preliminary air starting trial.

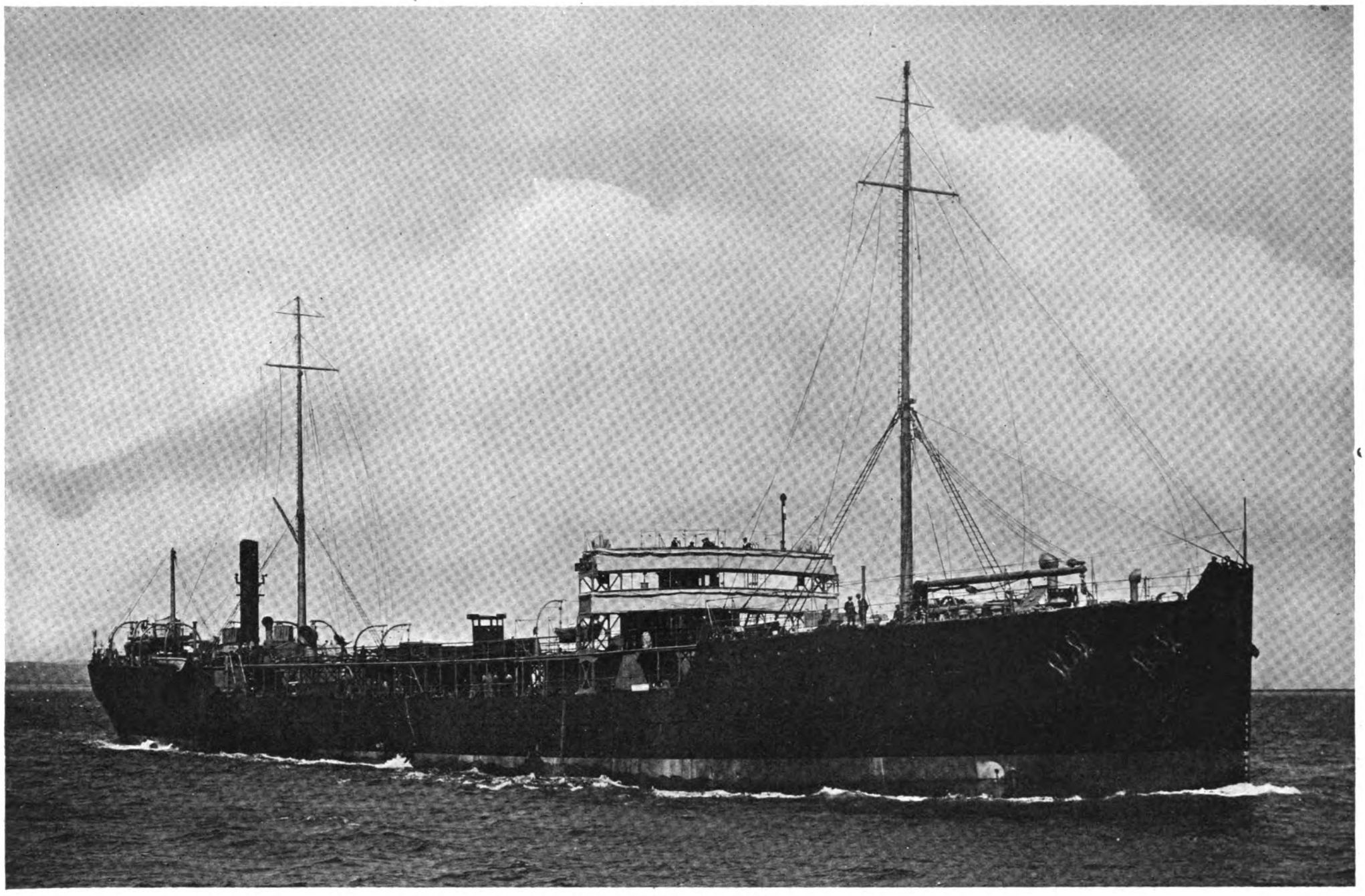
Load condition of engine as at full power.

Note.—The number of starts could have been increased, but the air bottles were some considerable distance from the engine, and due to the long length of pipe, considerable "wire drawing" took place.

For ordinary merchant-ship engines Messrs. Vickers will not endeavor to reduce the consumption below 0.4 lb. per shaft h.p. (0.3 lb. per i.h.p. hour), which is nearly equal to the best general air-injection Diesel engine practice. It is not worth getting better thermal-efficiency at a possible sacrifice of reliability. It is only

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Generated on 2024-09-13 14:17 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google



A VICKERS MOTORSHIP.

The Anglo Saxon Petroleum Company's Vickers-Diesel driven motorship "Santa Margherita." She is a vessel of 14,750 tons displacement and was originally built under the name "Olympia" for the British Admiralty, "purchased" by Sir Thos. Royden and afterwards transferred to the Anglo-Saxon Petroleum Co. of London who operate the Royal Dutch-Shell fleet of tankers. The total power of her propelling and auxiliary engines is 4,850 I.H.P. She carries 8,000 tons of bulk-oil cargo, 2,000 tons of general cargo, and 900 tons of bunker-oil at 11 knots speed on about 12 tons of fuel per day. A sister motor ship is being built by Vickers for the Anglo-American Oil Company, of London.

Digitized by Google
Original from UNIVERSITY OF MICHIGAN

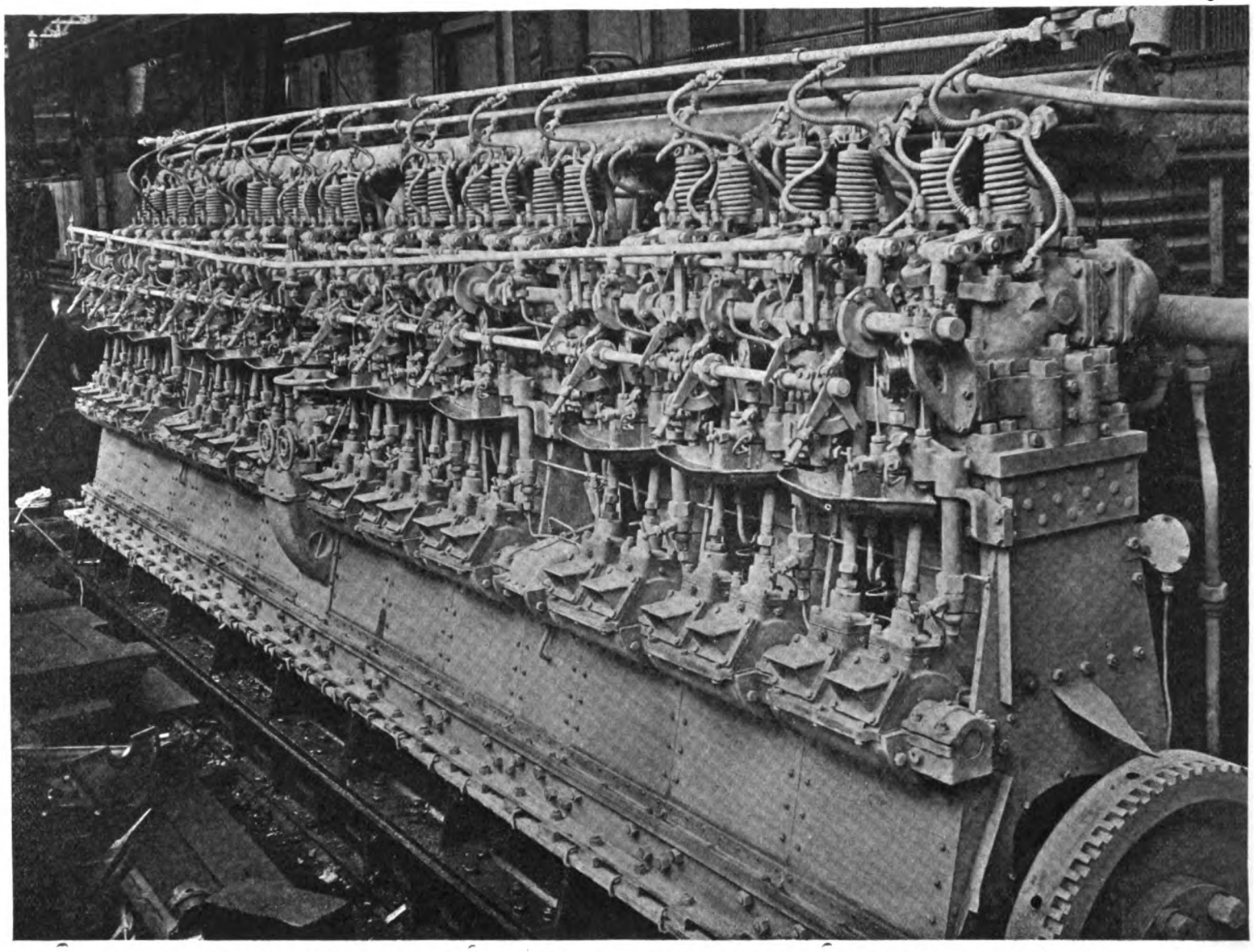


Fig. 9. The latest design of Vickers 1,200 B.H.P. 12-cylinder 4-cycle type submarine Diesel Engine.

one-third of the best oil-fired steam turbine consumption.

In Figure 8 we have one of four 10-cylinder 1,000 b.h.p. engines specially designed to suit Russian submarines, which during the war were without engines. Figure 9 represents the Vickers latest standard design of 12-cylinder submarine Diesel engine, and this develops 1,200 to 1,300 b.h.p.,. and is capable of considerably more than this load. A modification of this engine is shown in Figure 10, in this case the fuel-pumps being grouped into one battery, the valve-push rods shortened, and the double-camshaft substituted for a single one, this particular design being non-reversible. These engines have a bore of 14½ inches by 15 inches stroke, and at 380 r.p.m. develop 100 b.h.p. per cylinder with ease.

Reference to the view at the end of the engine in Figure 9 will show the unusual framing adopted, but which is not used with the commercial engine. The steel plate system of carrying the cylinder jackets, of course, is not new, but is rarely used. Personally we rather like the construction, but it is expensive, and we do not believe it would be quite so satisfactory if used with a slow-speed mercantile engine, although it has proven very stiff in its present connection.

The "columns" consist of boiler plate somewhat less than 13-16 in. in thickness. At the top is a forged-steel head into which the column plate it rabetted, three rows of rivets securing the head to the column plate. The plate is cut with lightening holes, and at the bottom is branched by a slot cut for removal of the main-bearing cap. To the lower extremities of these branches are riveted four forgings, forming the feet.

These are of approximately triangular elevation, and are plainly visible in the sectional view. The riveting of the heads and feet of the columns is most carefully carried out, the holes being reamed and the rivets inserted alternately from opposite sides to avoid bending the column. The column is stiffened by light angles on its outer edges, these angles forming the facing for light sheet steel plates forming

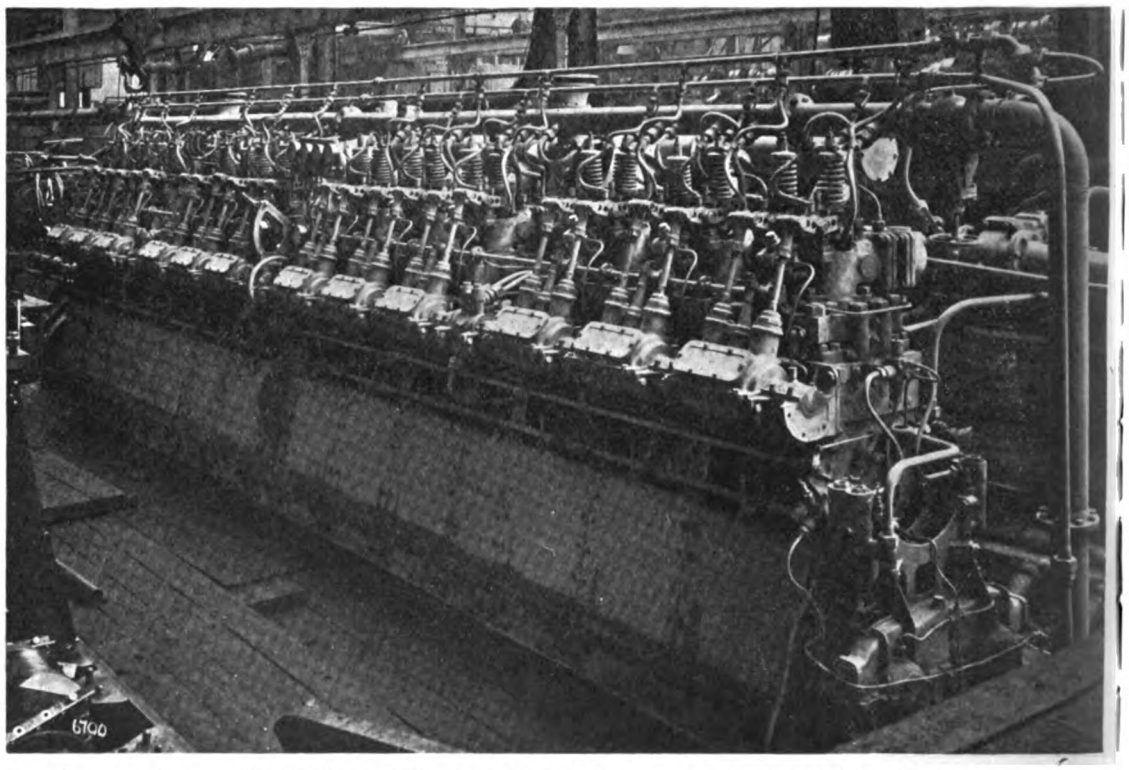


Fig. 10. Modification of the Vickers Standard 12-cylinder 1,200 B.H.P. Engine.

Generated on 2024-09-13 14:15 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

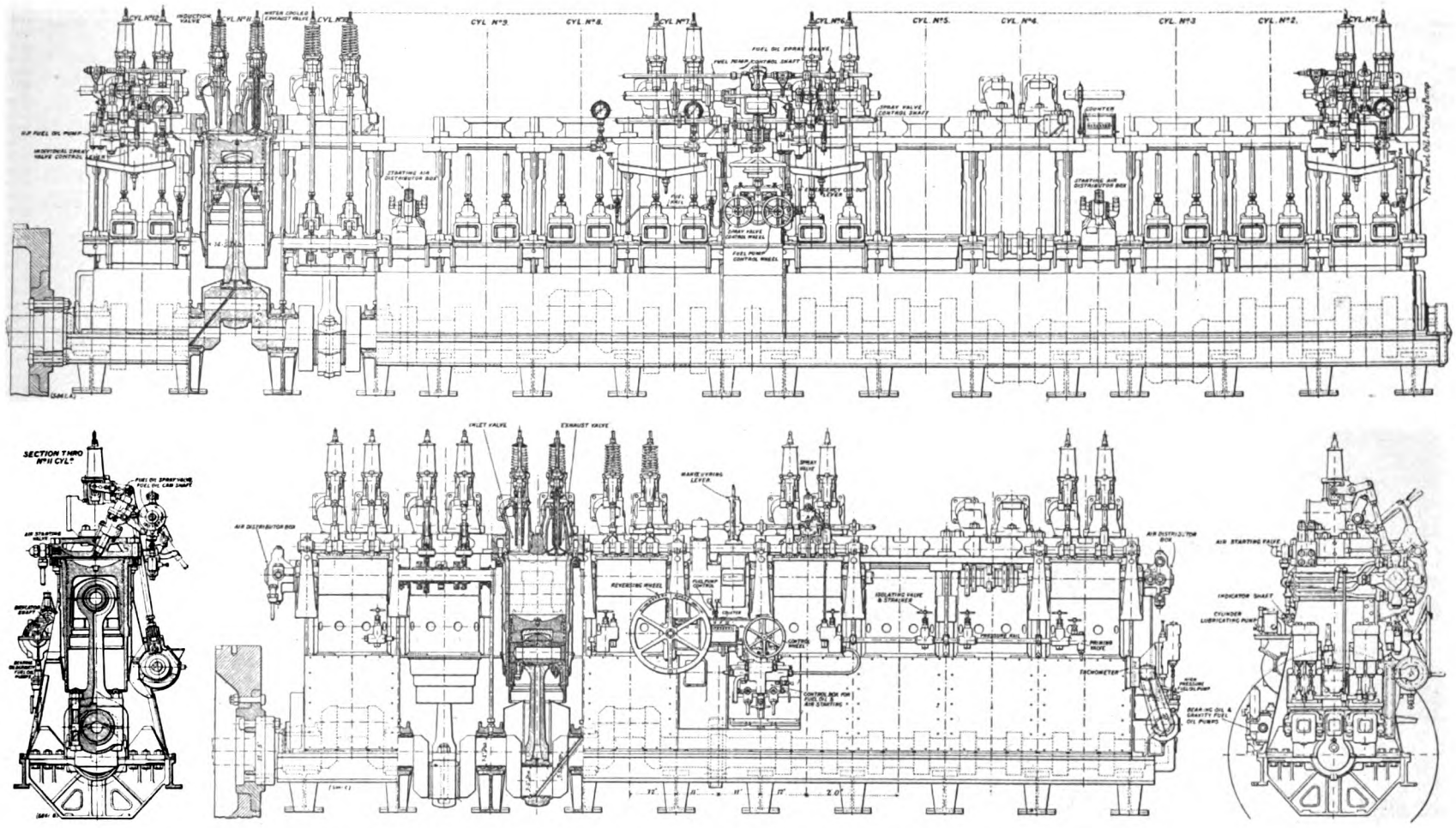
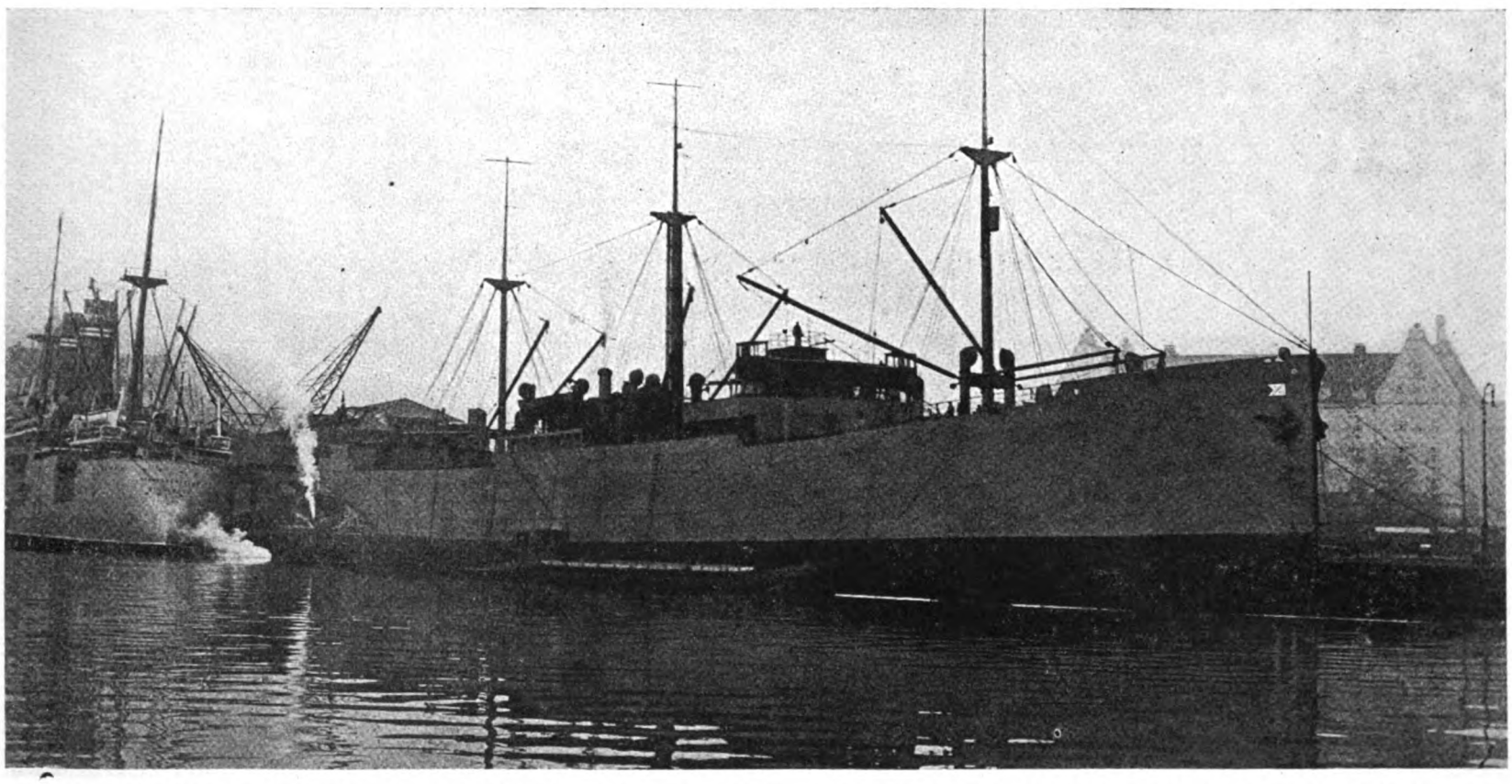


Fig. 12. General Arrangement of the 12-cylinder Vickers 1,200 B.H.P. submarine Diesel engines.

the sides of the crankcase. Small circular hand-doors are fitted in the outboard casing to facilitate feeling the liner and lower bearings. Further stiffness is given by angles plainly shown on the elevation which support the horizontal tie-plate below them. This tie-plate has a hole in it lightly larger than the cylinder-jacket bottom flange, and supports the latter by means of four adjustable snugs bolted to the tie-plate. On the column head is placed a sandwich or distance-piece, which takes the weight off the liner, and to which the cover is secured by six 1½-in. studs. The connecting joint consists of a cast-iron ring ground into both liner and cover. The main impulse-load is transmitted from the covers to the columns by two studs and four bolts, 1⅝ in. diameter, for each column between adjacent cylinders, two bolts only in addition to the studs being fitted to the end columns of each of the four groups of three cylinders, into which it will be noted the engine is divided.

This framing construction permits of close determination of stresses and lends itself to a light-weight engine, but the main practical advantage is in the extreme accessibility it gives to the crankhead and main bearings, while a cylinder is rapidly replaced should occasion arise. Accessibility and facility of overhaul are,



The cargo motorship "Borgland," owned by Fred Olsen of Christiania, Norway. She has a capacity of 327,279 cubic-feet of grain, and was built and Diesel-engined by the Akers Shipyard, Christiania. Her d.w.c. is 5,300 and she is of 2,000 I.H.P. Her engines are of the B. & W. type, which are being built in the U. S. A. under license by the Wm. Cramp & Son Ship & Engine Co. of Philadelphia. She recently made her third visit to New York. Compare her cubic capacity with that of an oil-fired turbine steamer of the same dead-weight capacity.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

of course, of the utmost importans for marine work.

The cylinder proper is very elementary in form and consists of a plain cast-iron liner surrounded by a corrugated sheet steel jacket. This latter terminates at its lower end in a pressed forging, to which it is welded, and at the top a flange is welded to the jacket and is jointed to the underside of the sandwich plate. The liner has a number of steel bosses riveted through it. These bosses are machined to form stuffing boxes through which the piston lubrication connections pass, these connections being screwed into the liner. Eight of these feeds are fitted to each cylinder, and are supplied by a sight-feed force lubricating pump.

In a future issue of "Motorship" we hope to give complete details of the new Vickers merchant engines of the Anglo-American Oil Company's new motorship, "Narraganset" At the time of our visit to Barrow they were under construction.

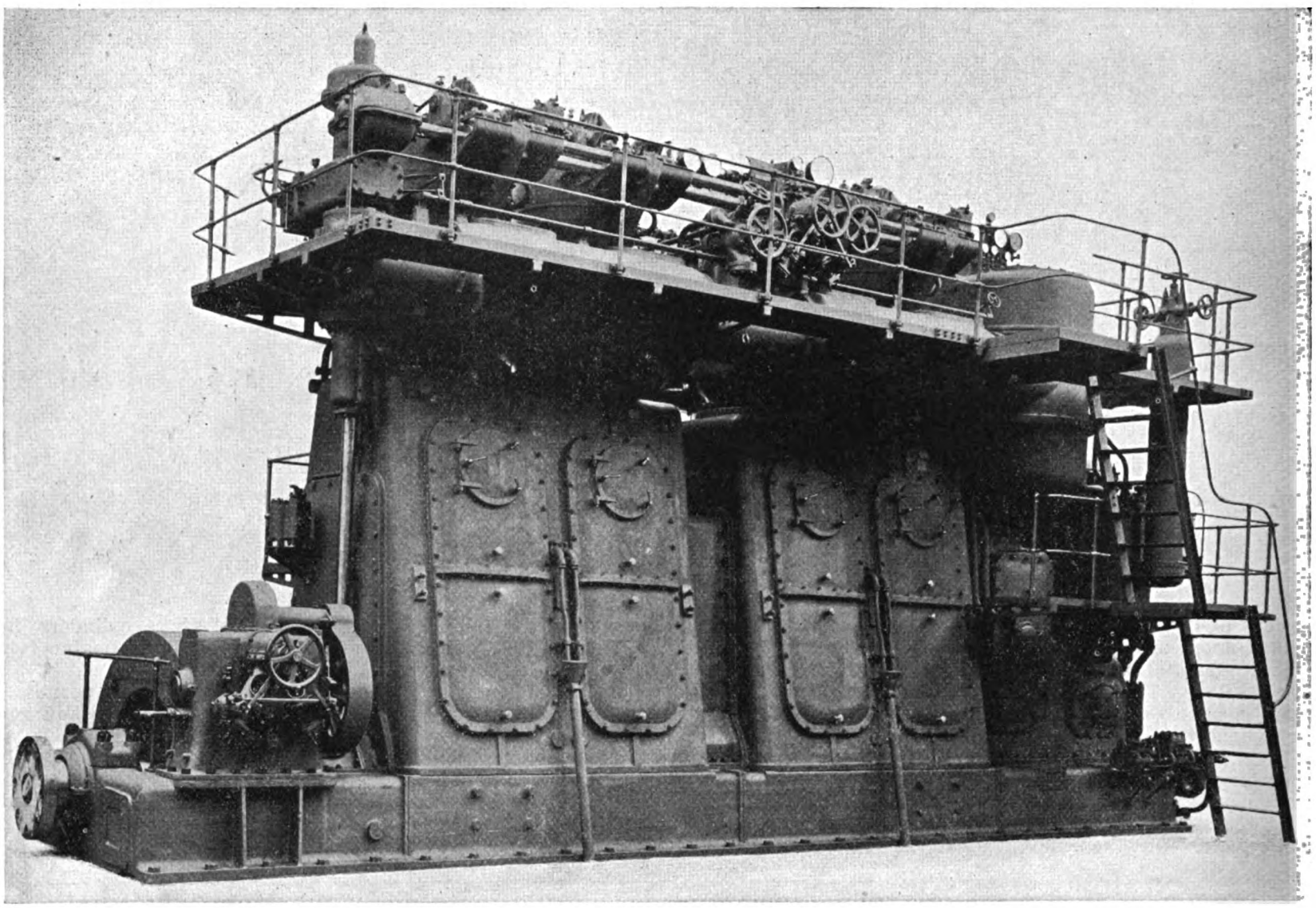


Fig. 1. Latest model Sulzer merchant marine Diesel engine. This one is of 1,250 shaft H.P. Comparison with the illustrations of the two earlier models show the great refinements in general design, which have resulted in a much cleaner engine.

Merchant Marine Diesel-Engine Construction in Switzerland

Shop Tests of the New-Model 1250 Shaft H.P. Sulzer Two-Cycle Motor—Preliminary Details of the 4200 Shaft H.P. (5550 I.H.P.) Cargo- and Passenger-Ship Model—A 40 ft. Engine-Room for 3,000 I.H.P.

By the Editor of "Motorship"

Winterthur, July 31, 1919.

THOSE who have followed the development and rapid progress of the Diesel engine have been aware since the earliest days of its adoption for merchant vessels, of the continuous controversy on the merits of the two-stroke versus the four-stroke cycle types. At times the rivalry has been very strong between the advocates of the different designs. In all shipping countries the interest in, and approval of, the rival types has been periodic. Often this wave of popular support of one type has lasted a year or more while there was a general disbelief in the future and reliability of the other cycle. Then there followed a reversal of general opinion, but opinion now is divided and the controversy still continues.

Not denying that there has been very important support given the two-cycle principles, the average opinion has shown a leaning towards the four-stroke cycle. Possibly this is due to the fact that the two-cycle Diesel engine had more supporters in the earlier days when little was known about the design and construction of internal combustion machinery; with the consequence that the failures resulting from inexperience were numerous and received an unfortunate amount of unfavorable notoriety.

Even today the two-cycle Diesel engine requires more skill incorporated in its design and construction than the four-cycle. Unless the former type is very carefully designed and built, it is liable to develop trouble under actual sea-going conditions. This is because of the greater strains in the metal caused by the larger number of heat units that has to be absorbed, or transmitted during a given period in comparison with the four-cycle design. Therefore, it may be inferred that it is somewhat rash to undertake the design and construction of high-powered two-cycle Diesel engines without previous and thoroughly successful experience with four-cycle construction. Without the guidance and assistance of engineers fully conversant with the particular problems, success with the two-cycle type for large marine powers is likely to be attained only after very

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

slow, laborious and expensive development of details. Domestic engine-builders will do well to bear this in mind.

There are several builders whose two-cycle Diesel engines are now giving most excellent service in actual practice and with reliability equal to that of the four-cycle motor. In more than one instance that success was not easily obtained, but resulted from careful analysis of experiences. Most of us know that in this world we all have to pay to learn, no matter what we seek to accomplish; and, we learn from our errors—not from that which goes smoothly. But in this case the learning of the past has done great harm because the user did not like paying as well as the maker, as he wanted all benefits without any share in the risks. A selfishness which does not assist progress.

Few technical experts will dispute that among the two-cycle Diesel engine builders, Sulzer Freres, of Winterthur, Switzerland, stand out very prominently, and that they have had results which so far have been unexcelled by any other two-cycle design. The results which these engines have given in marine service offer a serious challenge to the best four-cycle engines. Sulzer Freres have been assisted in attaining this position by the natural skill and patient industry of the Swiss mechanic. The accuracy of the machine work and fitting produced throughout their plant can hardly be improved on anywhere. The same attention to detail that for years have given Swiss watches and clocks their reputation is prevalent in all departments, with the result that when an engine leaves the factory, it is a product that will bear the closest inspection. At least, these are the impressions formulated from a recent visit to the engineering works of Sulzer Freres. We are not easily given to expressions that may seem like "blatant praise," but, having seen developments in engineering practice above the average, we feel no hesitation in giving credit where the credit is due.

Sulzer's experiences with the Diesel engine are too important to be cast to one side without careful thought, because of the highest powered Diesel engines in the world are of Sulzer construction and are of 4,000-4,500 b.h.p. each of six cylinders. Also they have had extended experience with a single-cylinder experimental engine of 2,000 b.h.p. Furthermore, they now build both four-cycle and two-cycle stationary engines up to 1,000 i.h.p. in addition to higher powered two-cycle marine engines.

While at the plant we were able to witness the conclusion of some shop tests of the first unit of a pair of 1,250 b.h.p. merchant marine Diesel engines. The erection of the second was nearly completed and it is due to run its trials a month or two later.

These particular engines were offered to American shipowners, but have been recently purchased by a British company. negotiations being under way at the time of our visit. It is most unfortunate that American shipping men should have lost the opportunity to secure this set, because the experiences to be derived from their service in one of our merchant ships would have been most valuable, especially as the construction of similar Sulzer engines has been commenced by the Busch-Sulzer Bros. Diesel Engine Co. of St. Louis, Mo., who are entering the mercantile marine field very energetically. **Since our visit four of these engines have been ordered by a Swedish firm of shipowners.**

The engine we saw on the test blocks is a four-cylinder, two-cycle, direct reversible enclosed type, having a diameter of 23.6221 inches and a stroke of 37.0075 inches. The designed output is 1,250 shaft horse-power at 100 revolutions per minute. At this rating the mean indicated pressure

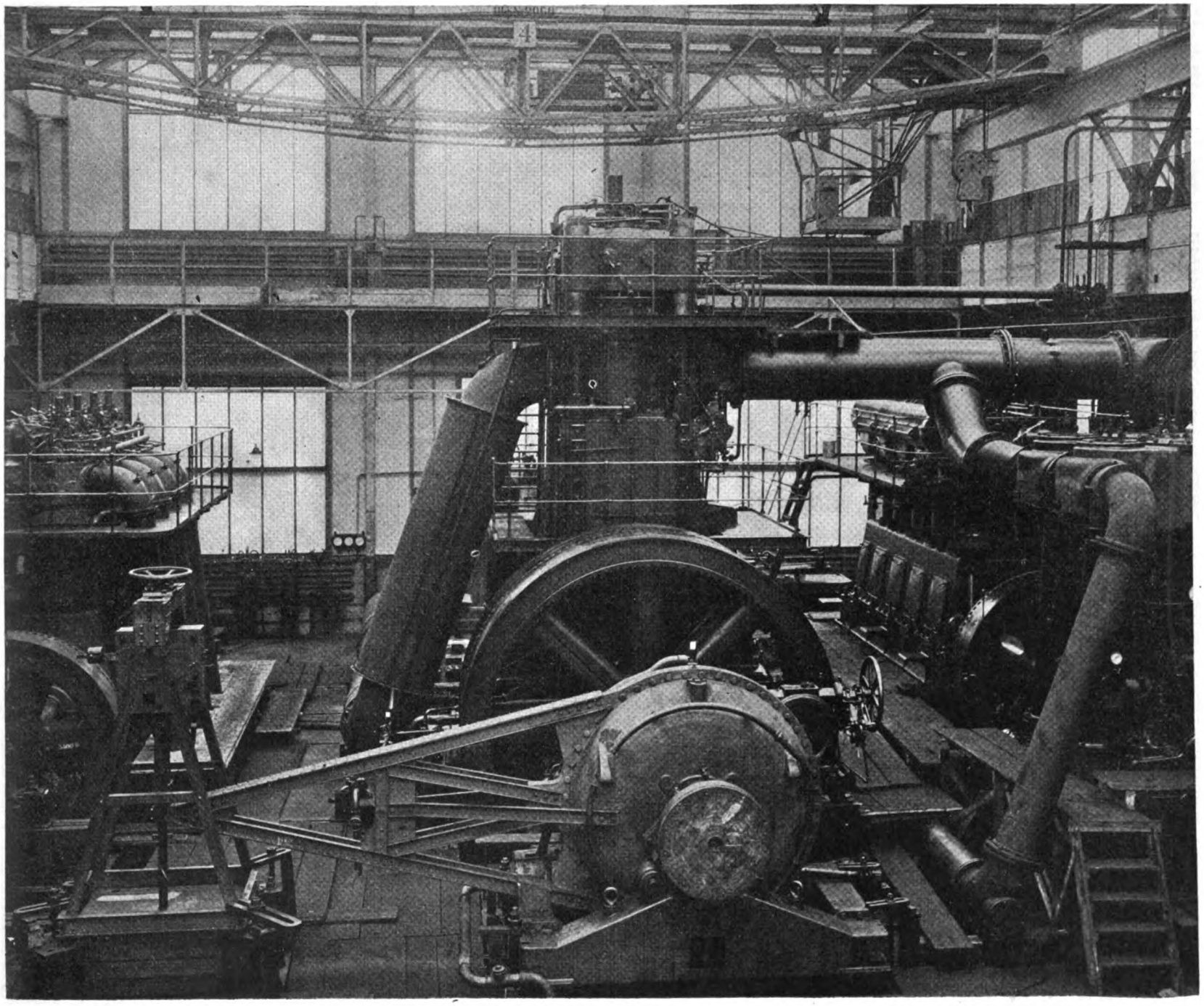


Fig. 2. A single cylinder Sulzer-Diesel engine of 2,000 B.H.P. with which many valuable experiments have been made during the last six years. The testing brake is a Heenan & Froude Dynamometer.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

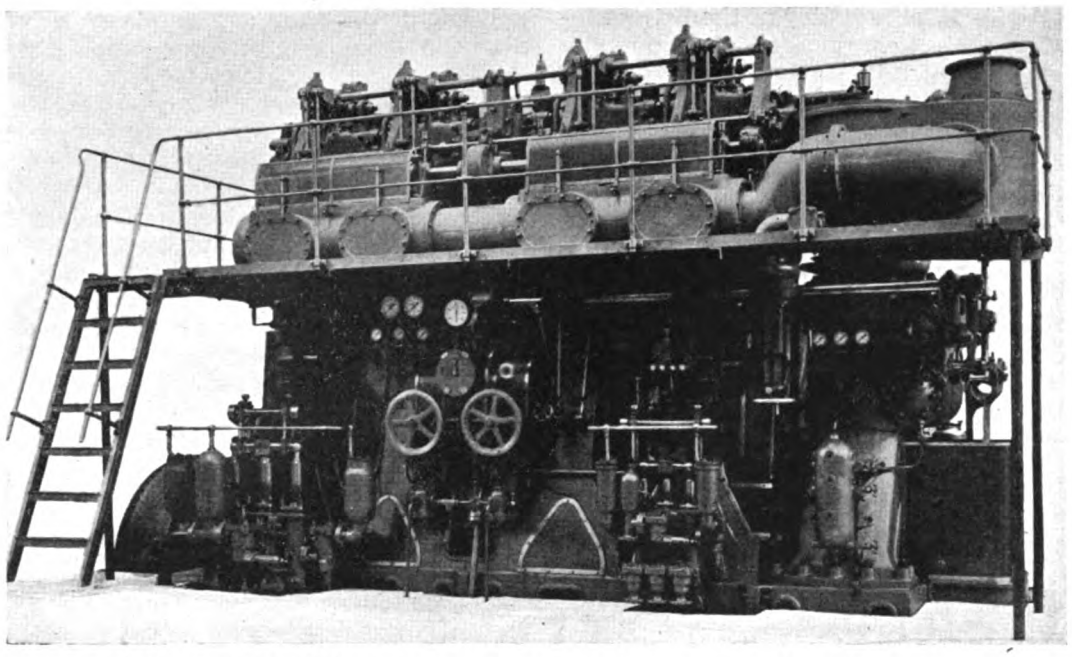


Fig. 3. One of the first large Sulzer merchant-marine Diesel engines. It is still giving good service.

is 100 lbs. and the mean effective pressure is 74 pounds per square inch.

Owing to pressure on our personal time, we were unable to make lengthy tests. However, these were unnecessary as the engine already had undergone extensive trials. Its first run was made on May 8th, 1919, and our visit was towards the end of July. These trials were made on gas-oil, tar-oil, Mazout, and Mexican crude-oil; the characteristics of which are as follows:

	Gas-oil	Tar-oil	Ma-zout	Mex. Crude oil
Lower calorific value cal/kg	10,090	8,874	9,804	9,727
Specific gravity at 15°C.....	0.89	1,022	0.942	0.9353
Flash point at O°C/760 mm	97	88	80	91
	=18,160 B.T.U.			=17,500 B.T.U.
Water content %.....	Traces	0.87	Traces	Traces
Ash content %.....	.....	0.03	0.02	Traces
Sulphur content %.....	0.3	0.5	1.0	3.0
Asphaltum content %.....	.....	.....	0.95	14.7
Residues at boiling analysis %.....	0.1	2.0	6.8	20.2

On the first day of our visit the engine ran at the rated load for about one hour, and then some slow-speed and maneuvering tests were satisfactorily completed without incident. The engine ran as slowly as 30 R.P.M. without cutting out any cylinder. From full steam ahead to full astern the time for reversing was from 10 to 15 seconds.

On the second day the following runs were made. At our request the tests arranged for us were reduced in period and the three-quarter speed and quarter speed runs were omitted because of the pressure on our time.

The engine was started for a warm-up on gas-oil fuel at 2:45 P. M. The injection air pressure was 64 atmospheres (941 lbs.) and after 3 hrs. 3 min. 24 sec., fuel consumption tests were begun and completed as follows:

Full-Load Fuel Test.

Fuel	Injection Pressure	Speed	B.H.P.	M.E.P.	M.I.P.
Gas-oil	64 atmos.	101.2 r.p.m.	1266	76 lbs.	101. lbs.

Consumption per B.H.P. 184.5 grams (0.406 lb.) Period 17 min. 54 sec.

Full-Load Fuel Test.

Fuel	Injection Pressure	Speed	B.H.P.	M.E.P.	M.I.P.
Mexican Oil	65 atmos.	101.2 r.p.m.	1266	76 lbs.	101. lbs.

Consumption per B.H.P. 199.2 grams (0.438 lb.) Period 21 min. 28 sec.

Overload Test.

Fuel	Pressure	Speed	B.H.P.	Period
Mexican Oil	75 atmos.	150 r.p.m.	1800	12 mins.

This overload, over 40 per cent, is not advised for marine work, except under stress of great emergency, although it is frequently necessary to use it in stationary work. About 60 per cent overload has been obtained with this engine and 2,000 shaft horse-power developed as per the indicator cards which we give. The change from gas-oil to the Mexican fuel was accomplished without stopping the engine, or adjusting the injection mechanism. The exhaust was quite clear except when running at 40 per cent overload when there was a "whitish" smoke at the exhaust outlet. The vibration at full-load was practically negligible, but when speeding up for the overload test the engine vibrated particularly at its critical speed, namely, 135 r.p.m. The vibration gradually subsided after 140 r.p.m. was reached, and at 150 revs. it was reduced to normal. For obtaining and recording the power the engine is coupled direct to a Heenan and Froude dynamometer, and the fuel supply tanks were mounted on balance scales, thus insuring accurate figures.

Regarding some of the trials previously run with this engine the following are a few notes furnished by the builders.

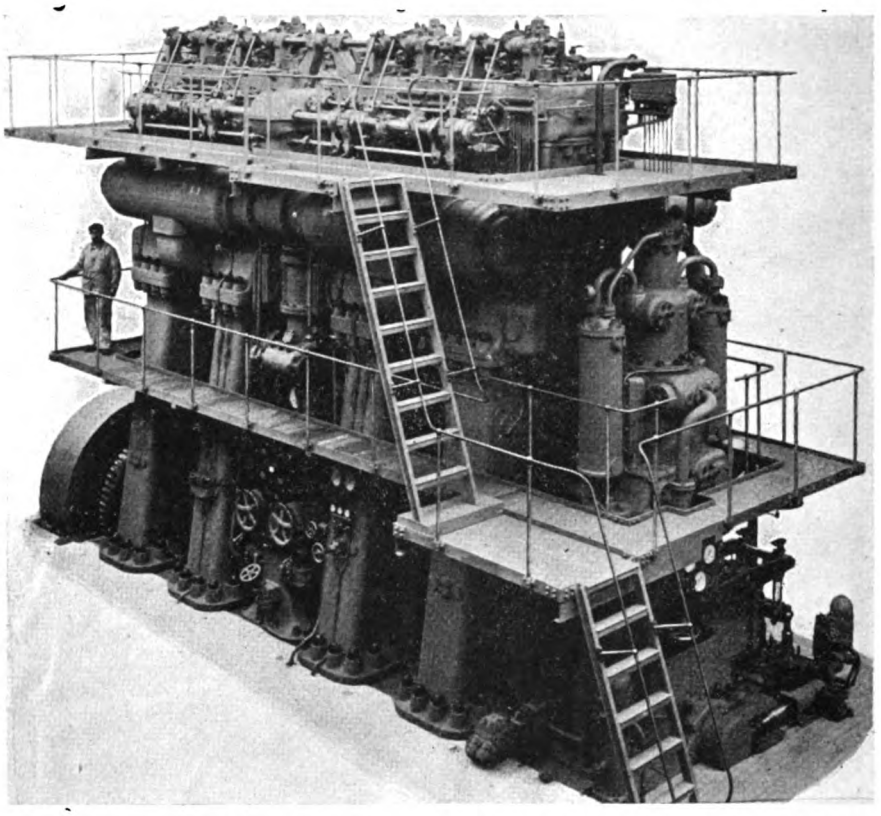


Fig. 4. A 1,600 shaft H. P. Sulzer-Diesel engine. One of a pair built for a twin-screw British Admiralty tanker.

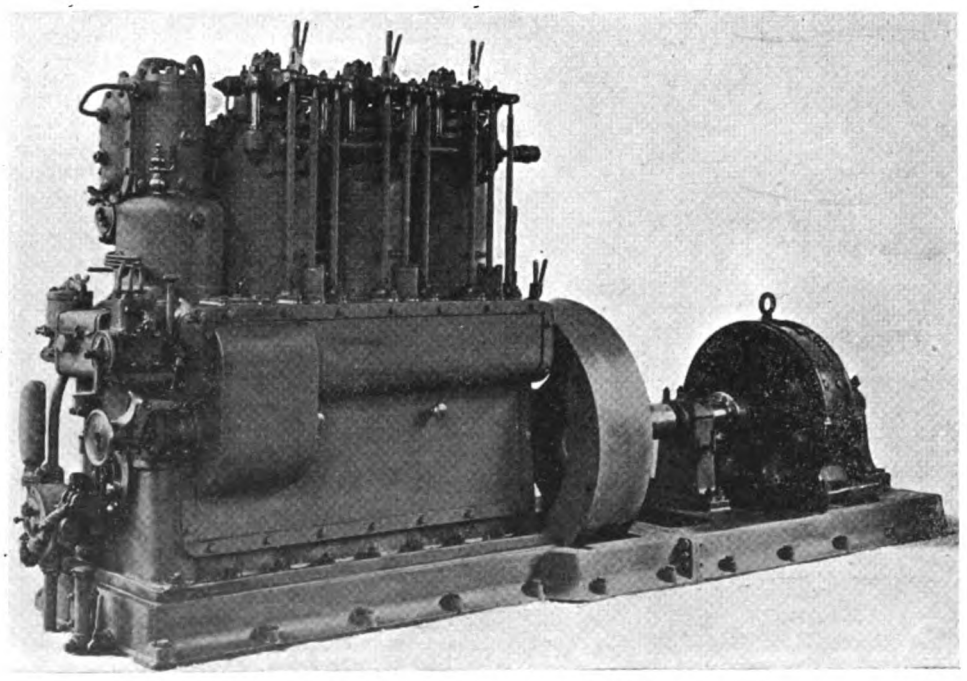
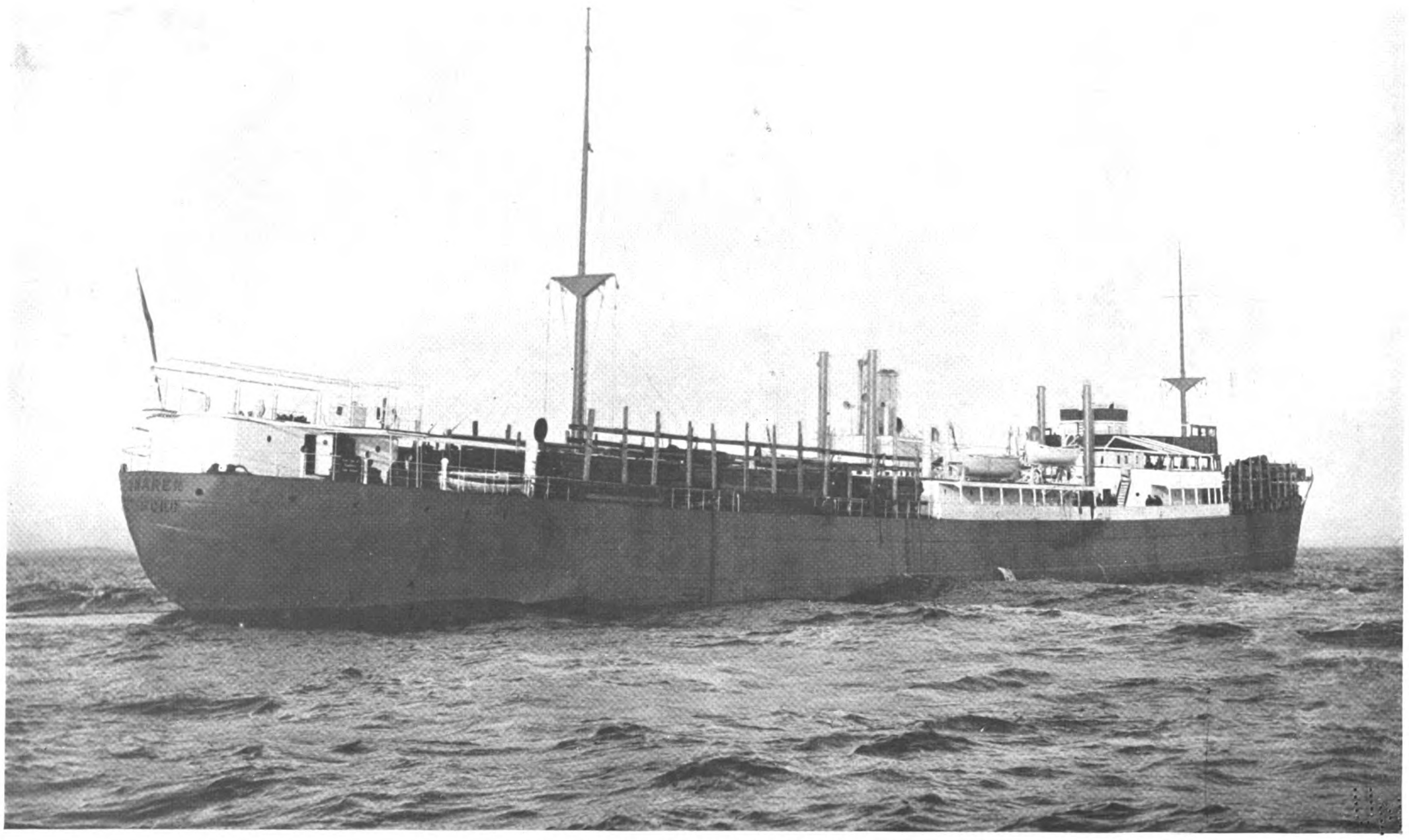


Fig. 5. Sulzer-Diesel 50 H.P. electric-lighting plant for ships.

Generated on 2024-09-13 14:19 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Supplement to the November 1919 Issue of "Motorship"



MODERN ECONOMICAL MERCHANT SHIPS NO. 34.

M. S. "Tisnaren." This is an unusually striking picture of the Rederiaktiebolaget Trans-atlantic's second motorship. On her first voyage she at times made better than 13 knots and over a distance of 23,887 nautical-miles she averaged 11.5 knots and consumed only 2,612 tons of heavy-oil fuel. For the first 8,000 miles of this voyage she was heavily laden, including the deck load of lumber shown in the illustration. The "M .S. "Tisnaren" was built and engined by the Götaverken of Gothenburg, Sweden, and is of 9,400 tons d.w.c. She is powered with two 2,000 I.H.P. Diesel engines of the four-cycle type.

Digitized by Google
Original from UNIVERSITY OF MICHIGAN

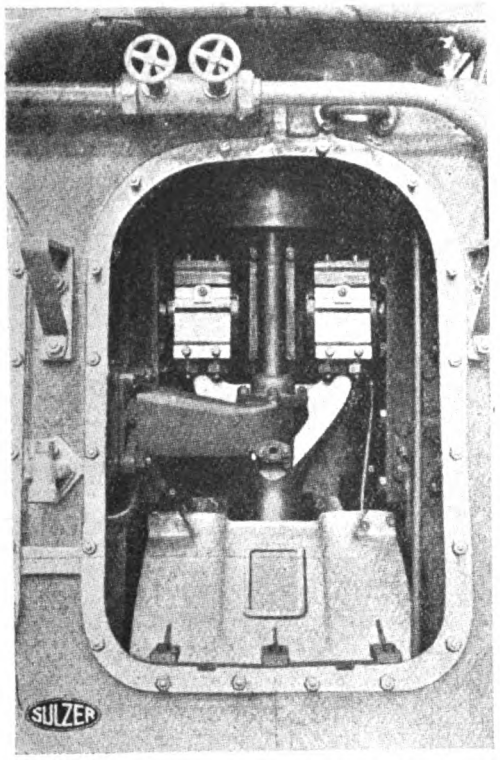


Fig. 6. Piston cooling and crosshead arrangements.

(1) The fuel consumption per b.h.p. hour when developing 1,250 b.h.p. at 100 revs. per min.

	Gas-oil	Tar-oil	Mazout	Mexican crude-oil
with				
was	190 grams (0.419 lbs.)	215.5 grams (0.475 lbs.)	194 grams (0.428 lbs.)	203.5 grams (0.449 lbs.)

During these consumption tests all auxiliary pumps were driven direct from the engine.

A further trial run was carried out with the auxiliary pumps (cylinder, piston-cooling, bilge and sanitary) disconnected. Diagrams and test results are shown in figure 15. The fuel consumption with gas-oil was 188.4 gr. (0.415 lbs.) per b.h.p. hour.

(2) *Trials with decreasing speed according to propeller law (proportional n^3) (with direct-driven auxiliary pumps).*

These tests were also carried out with all of the aforementioned fuel-oils. The exhaust was smokeless at all speeds and loads. As regards the results of these tests, see the chart. Fig. 14 and Fig. 16, curve B.

(3) *Trials with constant speed (n = 100 revs. per min.)*

The test results and fuel-consumption figures are shown on the charts, Fig. 16, curve A. The tests were made on gas-oil and the exhaust was invisible at all loads.

(4) *Maneuvering Trials.*

In order to test the maneuvering ability of the engine a series of varying maneuvers were made with gas-oil, tar-oil, Mazout and Mexican crude-oil. Slow speed and starting maneuvers can be performed just as easily with either tar-oil, Mazout or Mexican crude, as with gas-oil. The engine will start without fail under an air pressure of 10 Kg. sq. cm. (142 lbs. per sq. in.), and we witnessed starts made under loads with a much lower pressure.

Throughout the various tests the engine was running faultlessly, the noise being almost nil. All the working parts and bearings were in perfect order at the conclusion of the trials.

We will mention that at rated full load the output of this engine is equivalent to about 1,500 "steam" indicated horsepower, or to about 2,300 "steam" i.h.p. at maximum overload. This overload is too high for general marine use as previously mentioned, but it serves to illustrate the "overload" which a moderately rated Diesel engine is capable of developing in time of need, and which is not possible with a steam engine and boiler.

Before the final trials of this engine were completed, the designers will run experiments with a "blower" from one of their submarine engines which will replace the exhaust scavenging pumps. If successful, the "blowers" will be adopted as standard practice with the merchant marine engine, which will increase the mechanical efficiency of the engine. As it is proving quite satisfactory on the high speed naval motor, there appears to be no reason why it should not give equally good results on the heavier engine, and in addition it will save space and weight.

To those not familiar with the Sulzer design a brief description of this engine will be of interest, particularly as it is the latest model, and shows considerable re-

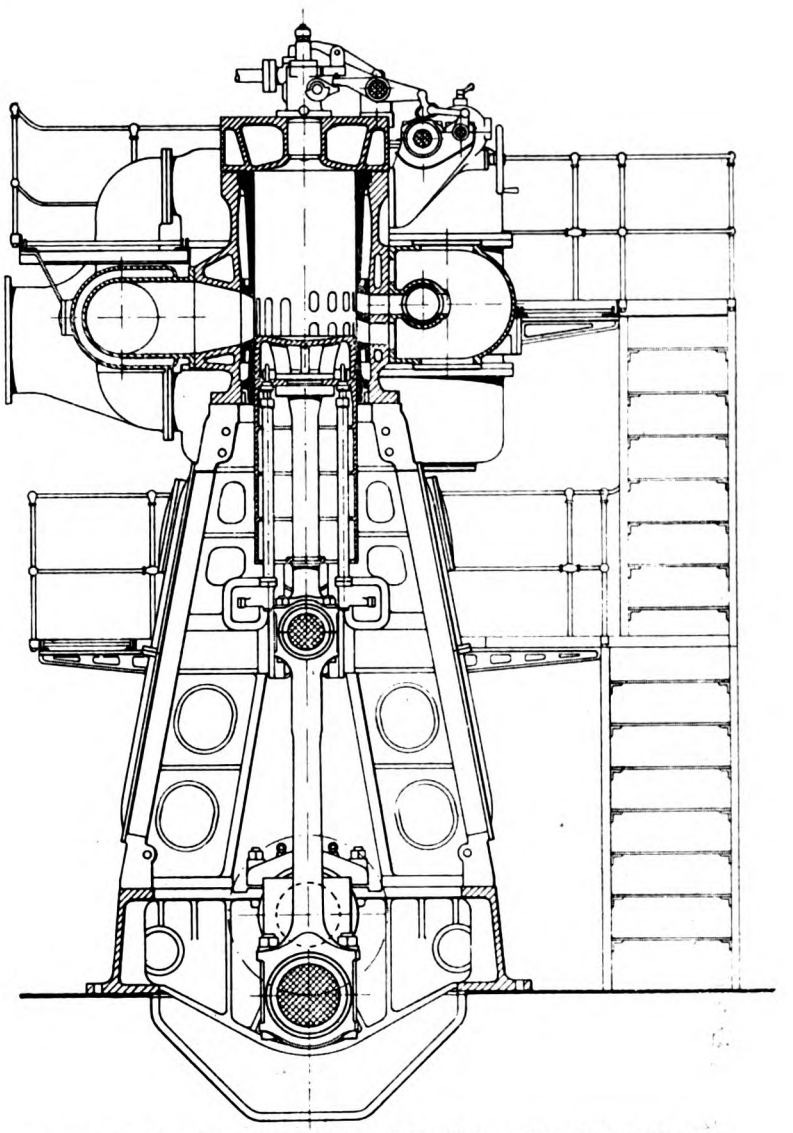


Fig. 8. Sectional drawing of the 1,250 I.H.P. Sulzer merchant type two-cycle engine.

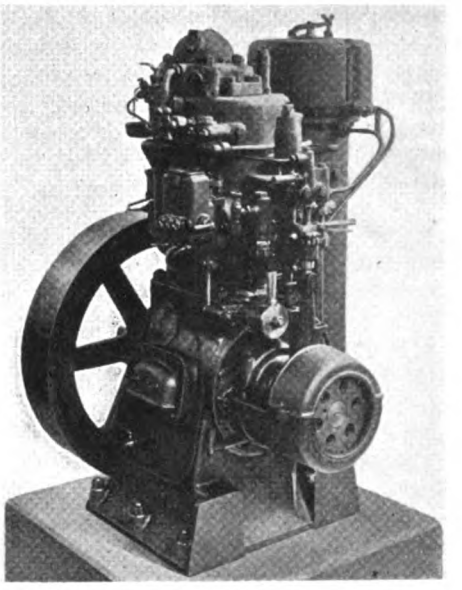


Fig. 9. A-6 H.P. Sulzer single-cylinder surface-ignition type oil engine for engine-room auxiliary purpose.

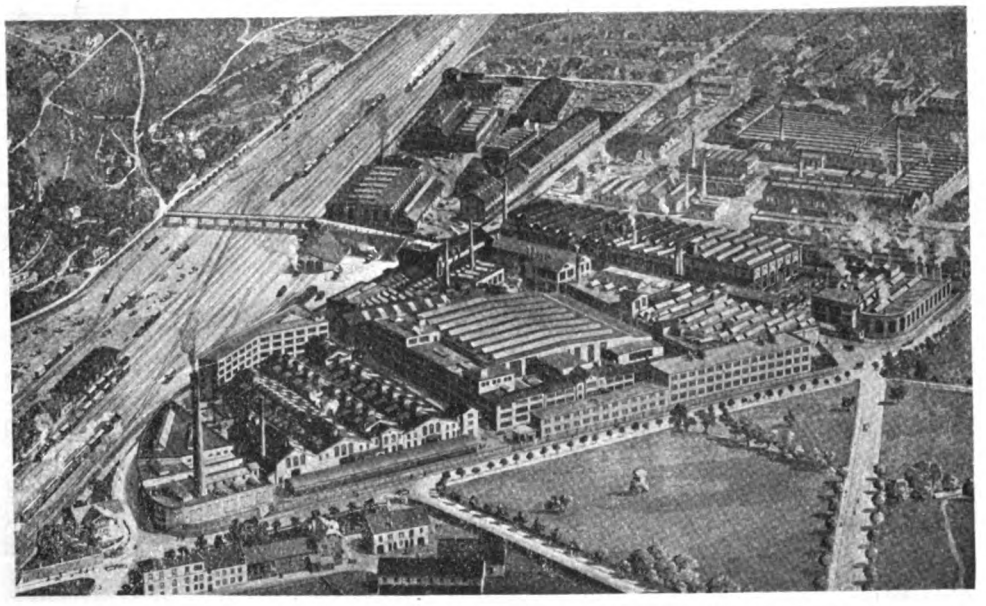


Fig. 7. General view of the Sulzer-Diesel Works at Winterthur, Switzerland.

Generated on 2024-09-13 14:06 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

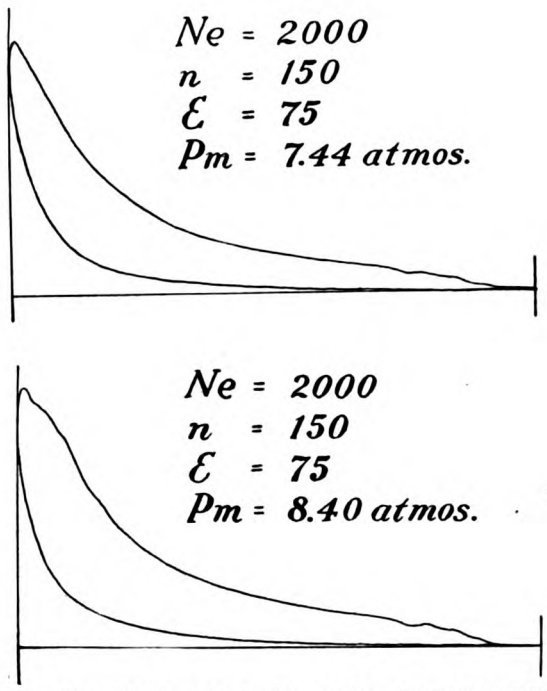


Fig. 10a. Cards taken with engine developing 2,000 shaft H.P. or 60% overload.

finement and improvements over the two 800 b.h.p. engines of the "Sabara" (ex. "Monte Penedo"), see Fig. 3, and the twin screw set of 3,200 total b.h.p. built for a big British Admiralty tanker (Fig. 4).

Having only four cylinders the engine is compact fore and aft for its power, and this means a small engine room and more space for cargo, an advantage over steam machinery which has certain claims of value.

In order to show the changes in the designs that have been made with the large Sulzer merchant type marine Diesel engines since 1912 we give the illustrations of the "Monte Penedo's" engine, the British Admiralty engine, and the new model now under discussion. It will be seen that the designs has been very greatly simplified with the result that a much cleaner looking machine has been produced, besides having the advantage of great accessibility.

Sulzers were the first important firm to abandon the valve-in-head scavenging in favor of port scavenging, and they are of the opinion that much of the unreliability of the early two-cycle marine engines was due to the valve-scavenging construction. One important American shipbuilding firm has been running tests with a 2,500 shaft h.p. valve-in-head scavenging marine Diesel engine and the engineering sections of the country are awaiting results to be published. They should prove to be most interesting and valuable.

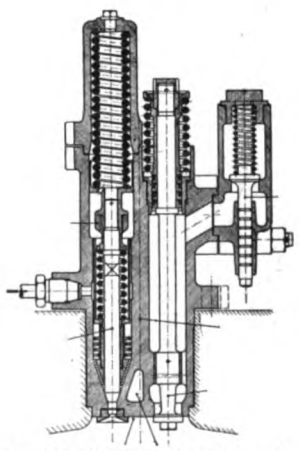


Fig. 11. Combined fuel, air starting and safety valve.

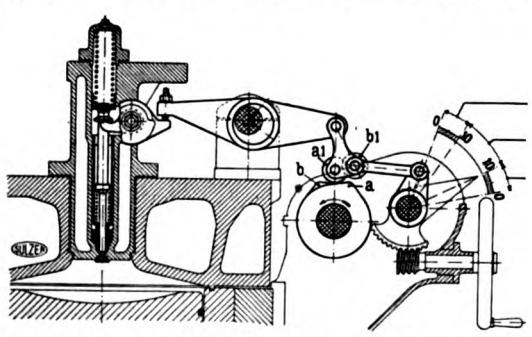


Fig. 12. Diagram of reversing mechanism and fuel control.

In the Swiss design, scavenging is effected through two sets of ports arranged one above the other in the cylinder wall opposite the exhaust ports. The upper row of slots is controlled by a rotary valve instead of the double-beat valves actuated by eccentricts and rods from the camshaft as first installed when the port-scavenging was adopted. The flow of scavenging air through the upper ports is controlled by the valve so the air enters only after the pressure of the exhaust-gases in the cylinder has reached its lowest point. The scavenging air continues to enter the cylinder through these ports until after the piston has covered the exhaust parts on its upward stroke. Thus it is possible to deliver a surplus charge of fresh air into the cylinder. The scavenging-air which drives out the exhaust gases is admitted at about 3 lbs. pressure per square inch. The rotary valves are driven from the vertical shaft driving the cam-shaft, and they are entirely closed, thus doing away with much external gear and rendering the machine quiet and simple mechanically. Pressure of the scavenging-air is low so that it is not difficult to maintain the tightness of the rotary valves.

The arrangements of the fuel-inlet and starting-air valves and the method of reversing are quite different from those which were previously adopted. It will be noticed that the fuel-valve and the air-starting valve are side by side and that they are both contained within one cage. The advantage of this is that only one hole is necessary in the cylinder cover. The design of the cylinder cover for efficient water cooling is thus simplified, reducing to a minimum the possibilities of cracks. Cylinder liners, jackets and covers are all cast separately.

In our issue of October, 1918, on page 15, we gave an illustration of the new Sulzer valve and the reversing mechanism arrangements. We again reproduce this illustration, but with the various parts lettered for descriptive convenience. The design has the object in view of avoiding both rotating the camshaft and moving it longitudinally, whilst it was also desired to allow for a variation of fuel-valve lift according to the load. For the fuel and air valves, they are two sets of cams side by side, arranged respectively at the required angles for astern and ahead operation.

Referring to said illustration, (Fig. 12 A is the cam for ahead running, which actuates a roller, A1, through which the valve lever is moved. As shown in the illustration, therefore, the engine is in a position for ahead running, and if it is desired to go astern, the hand wheel is turned, thus causing the quadrant to move, raising the roller (A1) so that it is no longer in contact with the cam, and lowering the roller (B1), which thus comes in contact with the cam (B), set for astern running. The fuel valve is thus opened at the correct timing for operation in the astern direction. By turning the handwheel through a small angle, it is possible to vary the lift of the fuel-needle according to the load. This is to avoid the possibility of misfiring, due to the excess of air at light loads with a constant lift of the fuel needle.

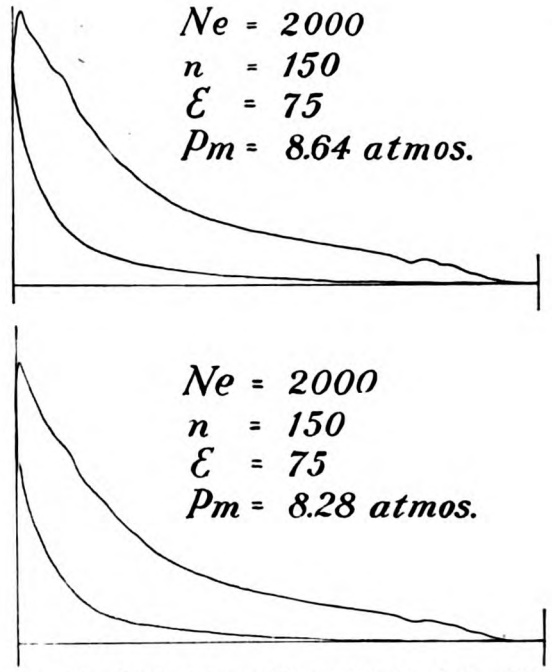


Fig. 10b. Cards taken with engine developing 2,000 shaft H.P. or 60% overload.

Regarding the blowers for scavenging, which probably will be fitted to all future merchant ship engines, these are of the turbo-type and the arrangement is to drive them by electricity, at about 3,200 r.p.m. As the power required is about the same as that needed for the electric winches, the electric motors for the blowers derive their current from the same auxiliary Diesel-electric-dynamo sets as are used for the motors of the winches. In port the turbo-blowers are not required, while the winches are not in operation when the ship is at sea. In this manner the capital invested in auxiliary sets is not standing idle part of the time, also the main engines de-

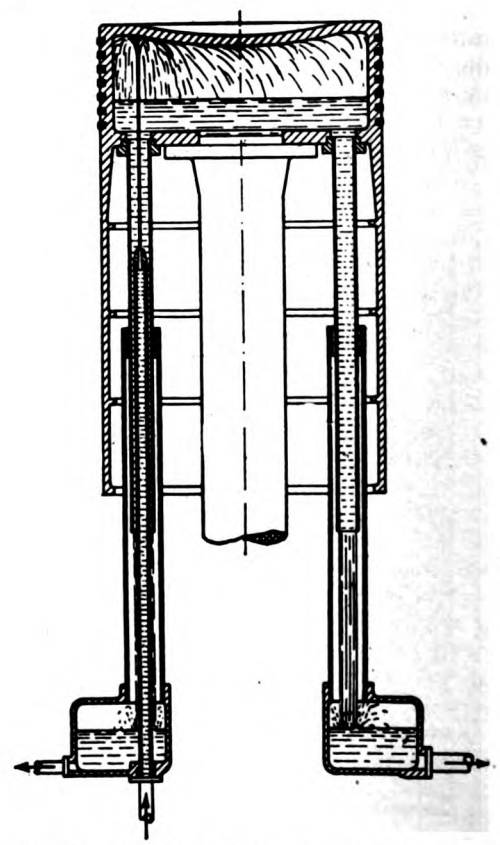


Fig. 13. Sketch of piston-cooling arrangement.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

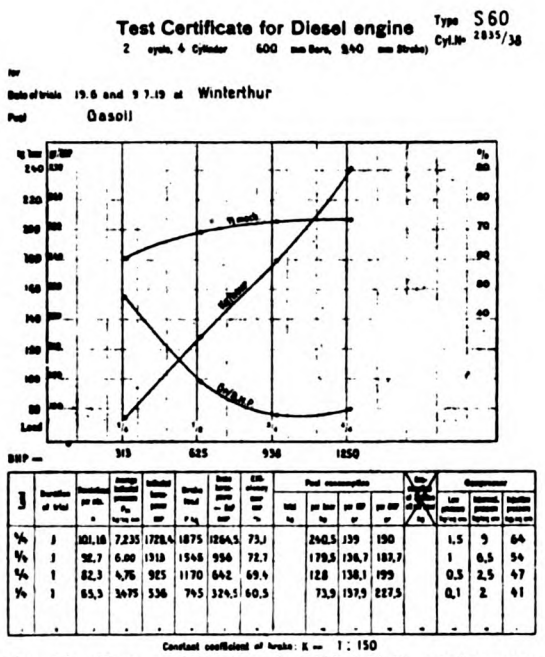


Fig. 14. Test certificate of 1,250 I.H.P. engine running on gas oil.

prived of their compressors, have a gain of 8 to 10 per cent in mechanical efficiency. Hence, there is quite a little to be argued in favor of the turbo-blowers driven separately from the main engine. Furthermore, when it is desired to increase the power of the main engines, the scavenging-air pressure can be increased simultaneously with an increase in pressure of the injection air, and so give additional emergency power to the engine without increasing its speed, or else both the speed and power can simultaneously be increased. But, as previously stated, this particular engine has a scavenging pump.

The space required by two of these four-cylinders engines aggregating 2,500 shaft h.p. (about 3,100 i.h.p.) allows the length of the engine-room—if arranged approximately amidship—to be in the neighborhood of 40 ft., or a saving of at least 20 ft. compared with the engine-room and boiler space of an oil-fired steamer of similar power and engine speed. This gain of 20 feet of cargo space, in addition to the even larger weight gain effected by the reduction in bunker-fuel and boiler-water is a most important point for the shipowner to consider. This saving of weight—combined with saving of space—is very important when a heavy cargo is carried. The total machinery weight is less than 250 lbs. per shaft horse-power, or 220 lbs. per i.h.p. The engine actually is 36 feet 7 inches long and weighs 150 tons, including all normal accessories.

We now come to some of the constructional features. Cast-steel has been adopted for the cylinder heads in preference to cast-iron, and as there is only one central opening for the combined fuel-injection and air-starting vales the casting of this head is greatly simplified. For the production of cast-steel, Sulzer Freres have their own foundry equipped with electric furnaces. Incidentally they have cast the steel webs for some of the built-up crankshafts made by themselves during the war period. They prefer solid forged crankshaft for Diesel engine work, and at the present time can purchase forgings at a lower price than they can be secured from the United States, although from time to time they have made extensive purchases of American-made crankshafts. Up to a moderate size they forge many of their own crankshafts.

As to the combined air and fuel-injection valves referred to above, these, together with the safety-valve, are arranged in one common water-cooled valve-cage, constructed of cast-iron, and the details of this can be seen in the drawing which we illustrate (Fig. 11). The main air-starting valve is provided with an auxiliary, or advance, starting-valve, which assists reliability of operation and so facilitates maneuvering of the engine. This auxiliary valve can be dismantled while the engine is running. The fuel-valve itself, it will be noticed, is of the enclosed upward-lift type with a torsion-shaft and stuffing box. That it is of effective design is evidenced by the fuel-consumption of 0.406 lb. per shaft horse-power hour, which is most excellent for two-cycle Diesel practice.

Turning to the design of the trunk-type pistons, it will be seen that they are made

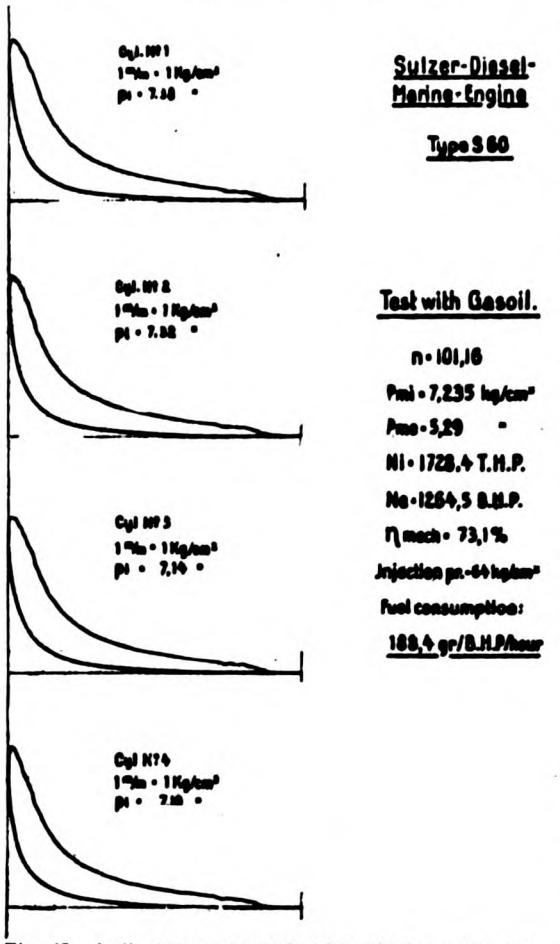


Fig. 15. Indicator cards with 1,250 I.H.P. engine running on gas oil.

in two sections, the main body being of cast-iron and the top of cast-steel. Cooling of the pistons is by sea-water through telescopic tubes without stuffing-boxes. The design of this piston cooling device was illustrated in our issue of October 18, 1918, but we again reproduce the drawing (Fig. 13).

Crosshead-and-guide construction has been adopted, the guides being bolted to the frames on either side and water-cooled. The crosshead-pins are or crucible steel and bored out. while the slippers are of cast-steel lined with white metal, and the clearance between the guides and slippers can be adjusted by means of thin brass liners on crosshead. To prevent oil leakage there are special boxes arranged at the bottom ends of the guides. The design provides for the box-type engine frame to take the whole of the combustion pressures. Accessibility is provided for by fitting very large steel-plate doors between the columns and in the upper part of these doors are smaller inspection doors on hinges.

There are strong stiffening ribs fitted to the bed-plate, the latter also forming the crankcase, and it is constructed in four pieces bolted together. Under the bed-plate is an oil trough of sheet steel.

The main bearings are of the roll-out type fitted into a square box which permits vertical adjustments. The shells are made of cast-iron lined with white metal. Special liners are fitted for adjusting the clearances. A system of forced lubrication is provided throughout. The crank-pins and journals are of Siemens-Martin steel, and the webs of cast-steel made at the Sulzer foundry. With this size of engine the crankshaft is built up in two interchangeable sections; the pins and webs being shrunk on. Each section is composed of two cranks set at 180 degrees to each other and the sections connected by coupling flanges are offset 90 degrees. The crankshaft for the scavenging-pump and air-compressor is forged of Siemens-Martin steel and coupled to the main shaft. A small crank is bolted to the extreme for'd end for driving the horizontal plunger-type cylinder-cooling and oil pumps.

It may be remembered that the majority of marine Diesel engine builders fit an electric turning-gear to their engines, using a motor of about 1½ horse-power for this size of engine, but the turning-gear of the Sulzer engine is operated by compressed air. On each main engine there is a three-stage vertical air-compressor for starting and air-injection purposes, and it has sufficient capacity to supply air for two engines, so that if anything goes wrong with one air-compressor both engines of a twin screw installation can be kept running.

The valves are of automatic "ring" pattern of nickel-steel and easily accessible. Efficient intercooling and draining is provided to each stage, by which means high temperatures and oil or water deposits in the high-pressure air bottles and tubes are obviated. Cooling is effected by sea-water. The injection-air pressure can be adjusted (according to the load) by throttling the air inlet to the first stage. For the purpose of lubrication the pistons are connected to the pressure oiling system.

Vertically above the crankshaft, in line with the working cylinders, is the scavenge pump, which, like the air-compressor, is driven direct from the crankshaft. It is of the double-acting type with automatic "ring" valves.

Turning to the fuel pump, this is of the multi-plunger type, one plunger for each

(Continued on page 71)

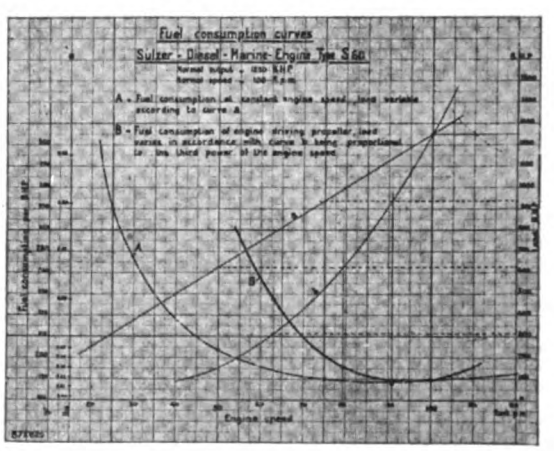
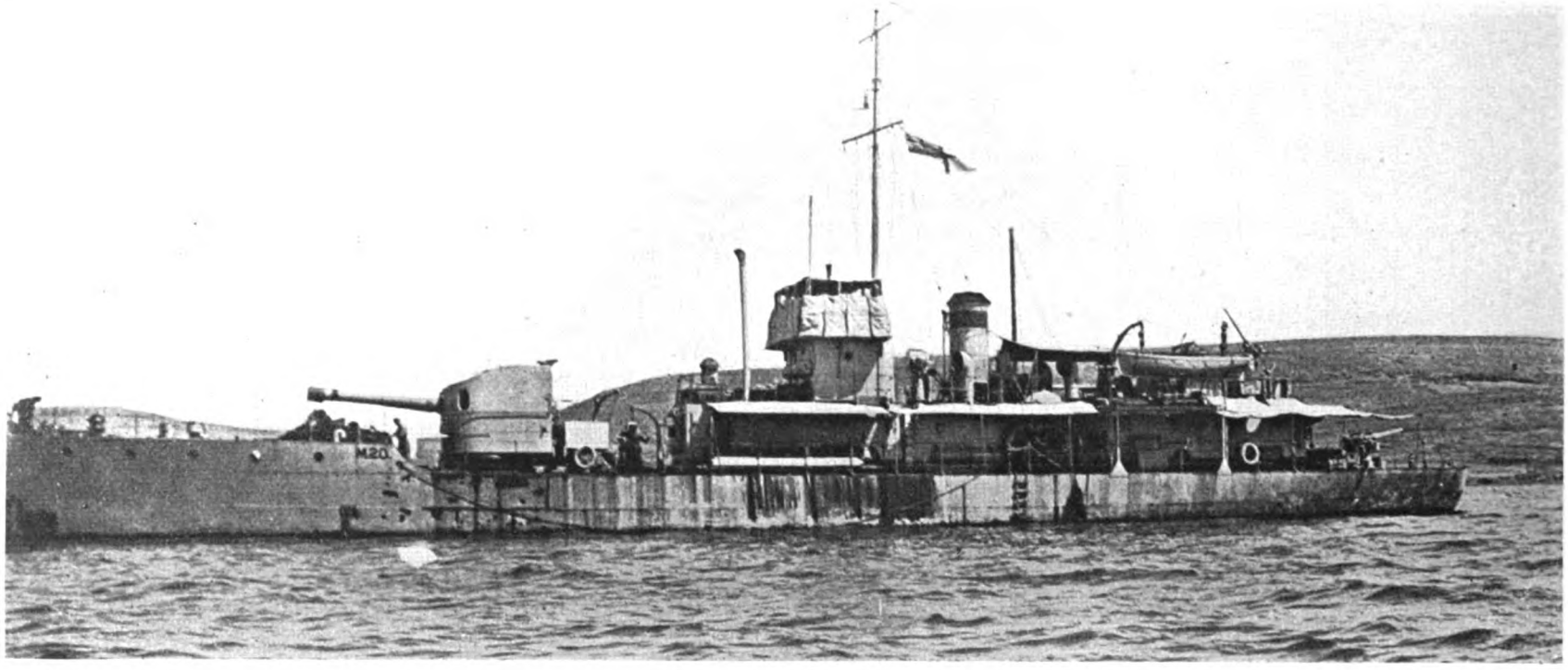


Fig. 16. Fuel consumption curves of 1,250 I.H.P. Sulzer merchant ship engine.

Generated on 2024-09-13 14:06 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



British Government Photo. (C)
The British motor monitor "M-20," propelled by twin 320 B.H.P. Bolinder oil engines. Seven sister monitors were driven by this Swedish motor.

Oil Engines in the British Navy

One Hundred and Forty-Two Vessels Fitted with Bolinder Surface-Ignition Motors During the War

REFERENCE has been made in the columns of "Motorship" to the large number of Bolinder surface-ignition type of heavy-oil machines purchased by the British Admiralty during the war; but we are now able to say that no fewer than 142 vessels were thus powered, the total number of engines being 267, aggregating 23,212 shaft horse-power. There must have represented a value of at least three million dollars and probably nearer four millions, with auxiliaries.

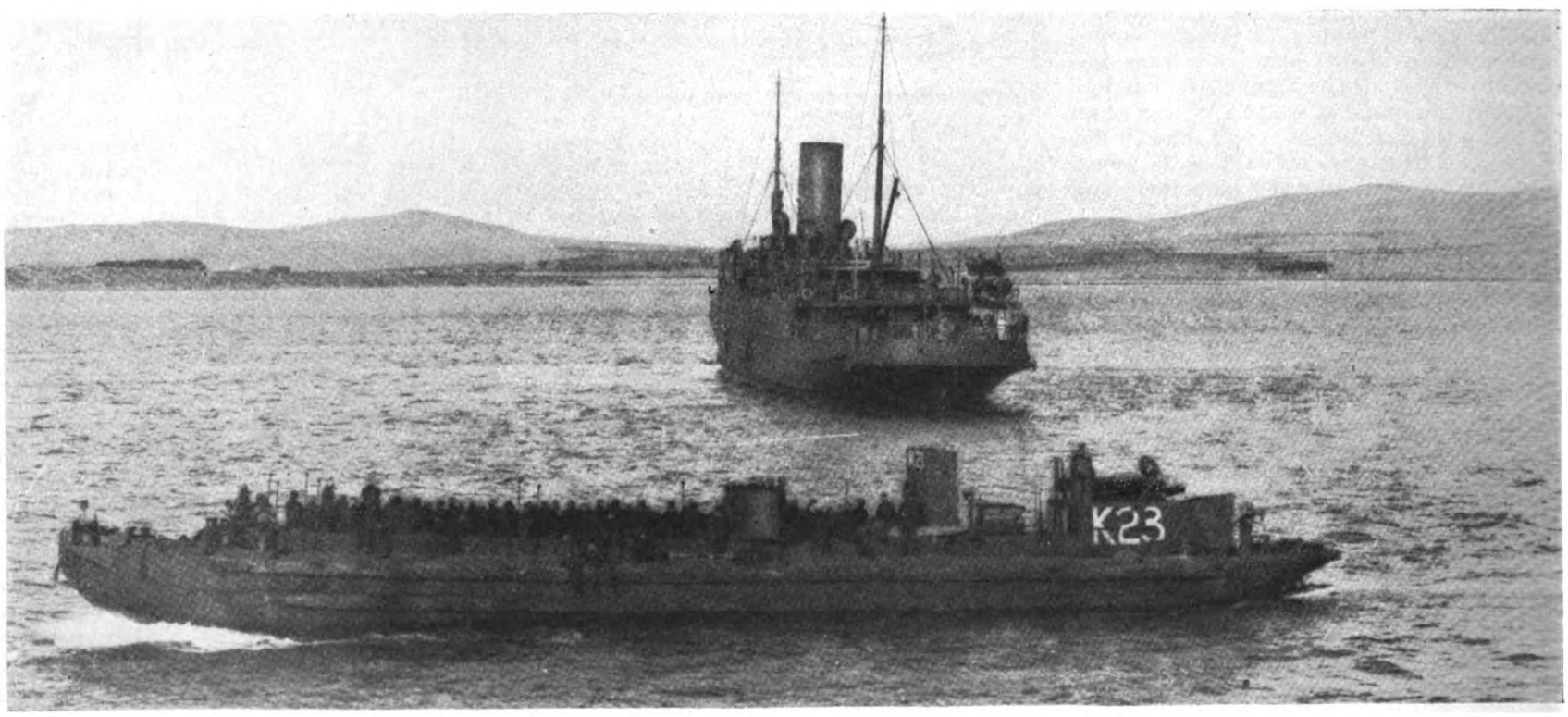
Most of the motorships in which these engines were installed can be segregated as follows:

No. of Craft, etc.	Class of Ship	Total Shaft Horse-power
8	Monitors	4,880 b.h.p.
4	Oil-Tankers	2,660 "
109	Lighters	7,660 "
17	Launches	380 "
4	Other types, including engines for various purposes	4,385 "
52	Motor Winches	347 "

Perhaps the most useful craft were the motor monitors which gave excellent services at the Dardanelles and off the coast of Belgium, etc. These are as follows:

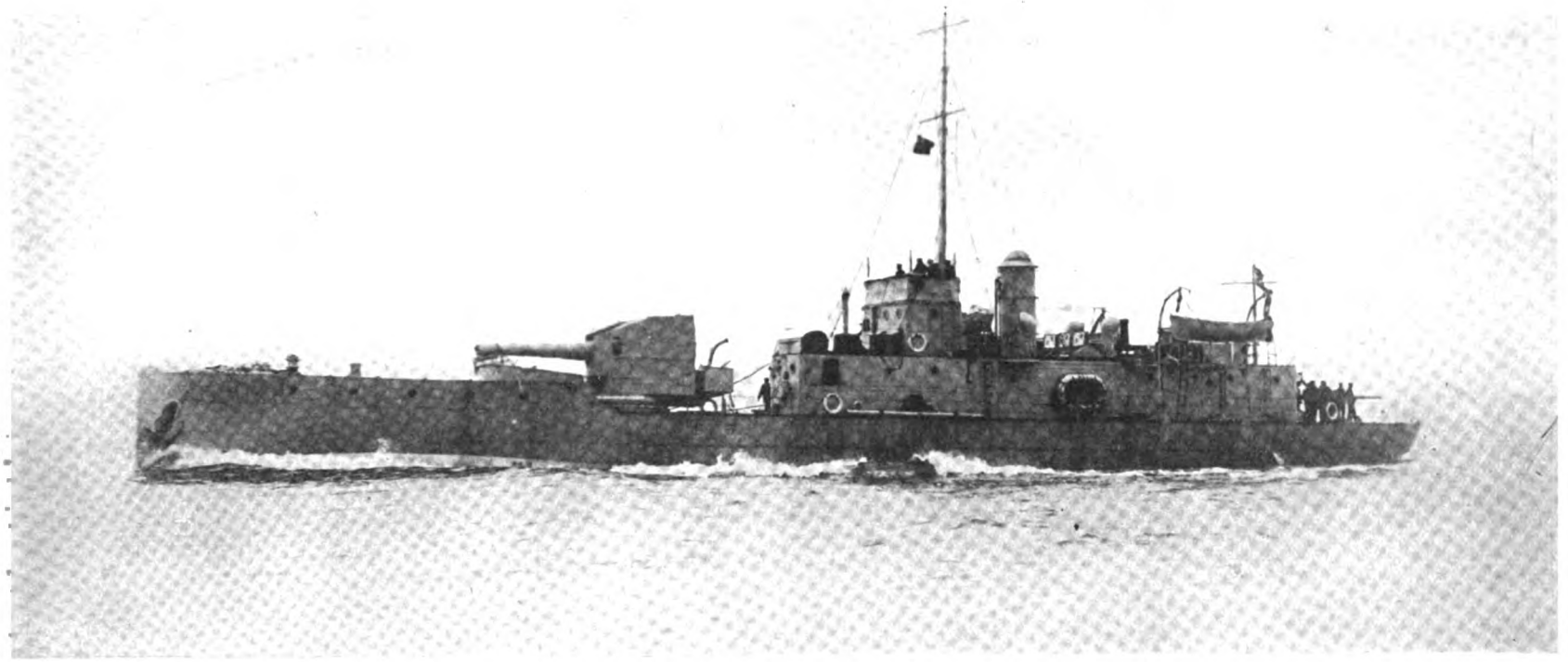
Name of Monitor	Shaft Horse-Power	Length	Breadth	Draught
M 18	640	170′	31′	12′ 2″
M 19	640	170′	31′	12′ 2″
M 20	640	170′	31′	12′ 2″
M 23	640	170′	31′	12′ 2″
M 25	640	170′	31′	12′ 2″
M 26	480	170′	31′	12′ 2″
M 27	560	170′	31′	12′ 2″
M 28	640	170′	31′	12′ 2″

Next in importance are the bulk-oil carrying tankers. These are the:



British Government Photo. (C)
One of the Bolinder-engined Admiralty lighters at work in the Dardenelles. No fewer than 109 lighters were equipped with this type of surface-ignition oil-engine by the British Navy during the war.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



British Government Photo. (C)
The quadruple-screw monitor "H. M. M-24," which gave good service off the coast of Belgium during the war. She is propelled by four 160 S.H.P. Campbell Heavy oil engines turning at 325 r.p.m.

Name of Ship	Horse-Power	Length	Breadth	Draught
"Oakol"	640	220′	34′ 7½″	16′ 6″
"Sprucol"	640	220′	34′ 7½″	16′ 6″
"Palmol"	640	220′	34′ 7½″	16′ 6″
"Teakol"	640	220′	34′ 7½″	16′ 6″

Nine of the motor lighters were of 160 b.h.p. and were 88 ft. long by 20 ft. breadth and of 8 ft. draught. Thirty-two lighters were of 80 i.h.p and were 105 ft. long by 21 ft. breadth and 7 ft. 6 in. draught. Six more lighters were of the same dimensions but of 65 b.h.p., and fifteen more were of 60 b.h.p, while twenty-four lighters were of 50 b.h.p and twenty-two were of 40 b.h.p

The installation of all these engines were carried out by Messrs. James Pollock Sons & Co., Ltd., of London, who have a shipyard at Faversham, Kent. This yard was laid out to construct concrete motor vessels, but after the war programme was completed it was turned over to small steel shipbuilding.

In addition to the above Bolinder engines, Messrs. Pollock supplies a number of 50 and 80 b.h.p. marine sets to the French Admiralty.

Solid-Injection Diesel Engine Construction at Doxfords, England

First of a Series of Standardized Motorships with Opposed-Piston Motors

Sunderland, Sept. 8th, 1919.

FOR fifteen years experimental marine Diesel engine development has been in progress at the engine department of the shipbuilding yard of Wm. Doxford & Sons, of Sunderland, England, at a cost of not far below half a million dollars. Now that war work has ceased the company is to make an effort to get an adequate commercial return for the time and money expended. Detail of their pre-war efforts were outlined in "Motorship" for June, 1917, and we will recall how they first produced a single-acting, two-cycle engine, and then reverted to the opposed piston, or Junkers two-cycle type, carried out their experiments with a single-cylinder model of about 500 h.p.m.

In this last engine which they now are starting to produce commercially, and if the first ship is successful they will construct them in fairly large numbers, and probably will erect an entirely new plant for their construction. Meanwhile the first complete engine is going through the machining stage, and the keel of their first standardized motorship will have been laid long before this appears in print. It is expected that by June or July next the vessel will be crossing the Atlantic on her maiden voyage to New York.

The engine for this ship is of the four-cylinder, two-cycle, opposed-piston type, with 560 mm. (22.947 ins.) fore in twice 1,160 mm. (45.669 ins.) stroke; that is to say, both the upper and lower pistons have a travel of 1,160 mm. on each stroke, making the total stroke 2,320 mm. (92.338 ins.). It is designed to develop 3,000 i.h.p. at 77 revs. per minute and will be able to run at 20 r.p.m. when maneuvering or entering harbor. This is a lower speed than can be maintained with most Diesel engines, and also is a lower speed than can be maintained under load by the average marine steam-engine. As reversing can be accomplished in a few seconds, the maneuvering advantages rest with the Doxford oil-engine compared with their marine steam sets. In order to demonstrate what the engine can do, Mr. K. O. Keller, the chief designer, ran the single-cylinder engine at various speeds for our special benefit and for about 10 minutes kept her at 20 r.p.m. under a load (Heenan and Froude dynamometer) slightly exceeding that of the propeller at sea as well as run at full load.

As regards fuel, this was a heavy Mexican crude with about 24 per cent asphaltum residue. This oil is the only fuel ever used with the Doxford oil-engine, except once when by mistake a much heavier and dirtier oil was delivered, and after using same Mr. Keller was able to scrape thick tar off the pistons. Mexican crude is also used for starting, but initial combustion is assisted by steam-heating the water-jackets, and, as steam auxiliary machinery will be installed aboard the ship, plenty of steam will be available for this purpose. We will mention that the cylinder compression is only about 300 lbs., compared with 410 to 500 lbs. for the average Diesel engine, so it is easy to understand why heating of the jackets is advisable when starting on Mexican oil.

Because of the foolish ruling, whereby the engine-room must occupy a certain amount of space in order to reduce the gross tonnage, no attempt has been made to reduce the length of the engine, so it occupies about the same space as a triple-expansion steam engine with its boilers of similar power; but there is a saving of approximately 150 tons in weight apart from the weight of the boiler water saved. The crankshaft is of the built-up type a little over 18 inches in diameter.

Every endeavor is being made to push forward the completion of this engine, and one machine shop is being entirely devoted to the work, and in order to avoid delay several steam engine sets for ships on order are being purchased outside. A new concrete testing pit is in course of construction.

One of the most interesting features of the engine is that a solid-injection fuel system of Doxford's own design is being employed, the fuel-pump pressure varying from 2,000 to 10,000 pounds, according to the power being developed. At a later date we expect to fully describe both the new engine and the motorship.

Generated on 2024-09-13 14:22 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Many Motorships Building for the British India Steam Navigation Company and for the Royal Mail Steam Packet Co.

Unusually Complete Electrical Auxiliary Machinery to be Installed Aboard Four Diesel-Driven Passenger Vessels for the British India Co.—The Advent of the North-British Marine-Diesel Engine

Glasglow, Scotland, Aug. 25th, 1919.

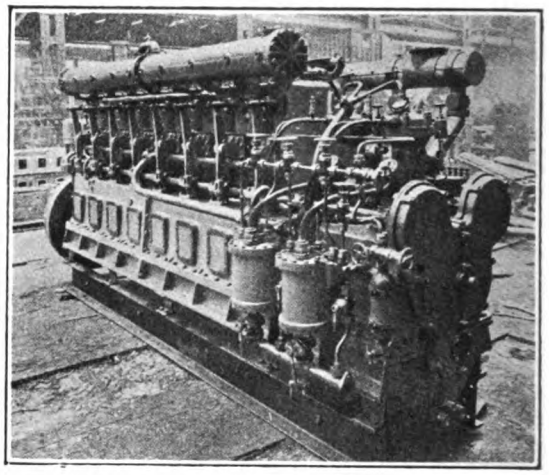
NOW that Government control has somewhat loosened some of the more enterprising British steamship companies are turning very serious attention to rapid building of large Diesel-engined motorships, as indicated in our last issue. On the other hand, the great majority of British shipping interests—like some of our own shipowners—are still either scoffers or skeptical, or are quite indifferent to the remarkable progress that is being made, principally because they have no conception of what is going on under their very noses. The most extensive construction is being carried out in the Pirrie-controlled Harland & Wolff and associated shipyards, including the Barclay Curle plant. At these yards many motorships—some of large tonnage and 14 knots speed—are being built for the Glen Line, Elder Dempster Co., Bibby Line and the Royal Mail Steam Packet Company. As we have previously stated, no fewer than seven Clyde-built motorships are already in the service of the Glen Line, including the m.s. "Glenapp," which is the largest and fastest motorship at present on the high seas.

Why other British shipowners are not properly familiar with what is transpiring in the way of motorship construction in their own country is partly due to the reticence of Lord Pirrie, who during the war was the Controller of British Merchant Shipbuilding. While most other yards last year were devoted to warship and steam cargo-ship constructions, one of the Pirrie-controlled yards built the "Glenapp" in secret and so a distinct lead thus was obtained over other British builders. It may be remembered that "Motorship" was the first publication to give details and illustrations of this noteworthy Diesel-driven vessel, although Lord Pirrie had given strict injunctions that no information was to be given to the technical press. Even today—although the war is over—strict secrecy is being maintained regarding work in progress at the Harland & Wolff motorship yards in the Diesel engine-works. Nevertheless, we can say that, based upon reliable information, several of the Pirrie controlled shipyards are gradually being devoted to the construction of Diesel-driven merchant vessels, and that the Lancefield Quay Diesel-Engine Works of Harland & Wolff are being extended to meet the increased demand for motor machinery. The total output is expected to soon reach 18 motorships a year. In addition to seven more motorships for the Glen Line, they are building four, or more. Diesel vessels for the Royal Mail Steam Packet Company and some for the Elder Dempsey and Bibby Lines.

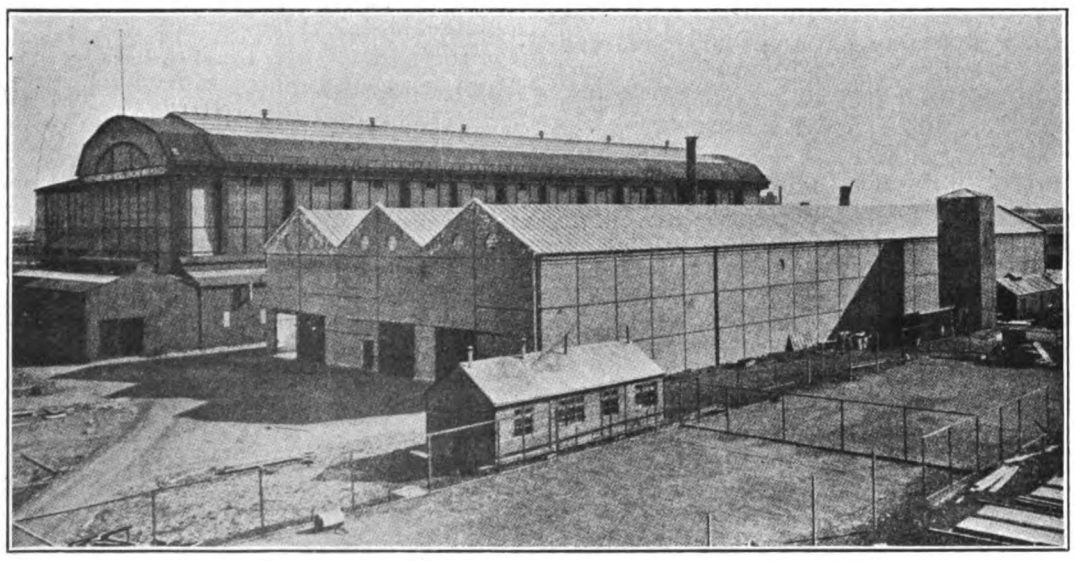
In one sense—if one forgets the patriotic side of a man's duty toward his nation—one can hardly blame Lord Pirrie for refusing to give publicity to what his yards are doing. His excellent foresight, coupled with his remarkable grasp of business, together with the energy displayed in personally investigating the motorship question in its earliest days whilst other shipowners peacefully slumbered, has placed him in the position of being the leading motorship builder in Great Britain. Therefore, from a purely business point of view it is not difficult to understand that he desires to exclusively retain the benefit derived from the money expended in the past for the shipowning companies with which he and his shipyards are connected. This will enable their motorships to be operated at a profit compared with other owners' steamships, should a shipping slump occur in the near future.

In an interview with Mr. Harland, of Harland & Wolff, this gentleman frankly stated that for business purposes they desired to keep strict secrecy regarding their motorship construction programme, and because of this they could not admit us or the U. S. Shipping Board representative to their Diesel-engine plant, or motorship yards. That they regard this work with so much importance, no doubt will stir American shipowners into quick action, and be partly the means of orders being placed for many new and fast motorships and the conversion of existing steamships to motor-power as rapidly as feasible.

However, we are glad to say that such secrecy is not being maintained where other British companies are concerned, which, of course, is to the benefit of the British nation and naturally is of interest to our own shipowners.



One of the twelve sets of 240 B.H.P. Nelseco Diesel engines built at the North British Diesel Engine Works for the British Admiralty.



Western side of the main shops of the North British Diesel Engine Works. The offices are on the eastern side of these buildings and the river Clyde is at the south end.

Orders for four twin-screw passenger motorships of substantial tonnage have been placed by the British India Steam Navigation Company, and one of these vessels will be turned over to the Union Steamship Company of New Zealand. This latter vessel will be of 4,000 I.H.P. Both companies are controlled by Lord Inchcape, who is another energetic and progressive British shipowner.

The Diesel-engines for these four ships are now under construction at the plant of the North British Diesel Engine Company at Whiteinch, Glasgow, from their own designs. Each engine of the three ships that the British India S. N. Company will operate has eigh cylinders, 26½ in. bore by 47 in. stroke, and will develop 2,330 I.H.P. (equivalent to 2,250 steam I.H.P) at 96 R.P.M., and is of the four-cycle, single-acting, direct-reversible type. So while a good piston speed is allowed, namely, 752 per minutes, the engine turns at low speed, giving good propeller efficiency.

These vessels will be very noteworthy, as they will be more completely electrically equipped than any motorships at present in service, all the deck and engine-room auxiliary machinery being Diesel-electric driven; even the ranges in the kitchens and galleys will be electrically heated. Consequently, there will be four auxiliary Diesel-engines totalling 1,400 h.p., bring-

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

ing the Diesel power of each ship up to over 6,000 I.H.P.

The auxiliary machinery will comprise two six-cylinder North British four-cycle type non-reversible Diesel-engines of 400 h.p. driving air-compressors, and two similar engines, but of 300 h.p. apiece, coupled with electric generators.

In a future issue we hope to fully describe these Diesel-engines. also the North British Co.'s works, but at their request we will await until the tests of the first ship have been brought to a successful conclusion, which should be about next spring. At present the engines are only nearing the erection stage. In our June issue we referred to one of these vessels. and in error stated that both the hull and machinery were being bult at Harland & Wolff's. However, only the hull is being constructed by the latter concern.

Another order consists of a North British Diesel-engine of the 1,750 I.H.P. for converting a steam-driven single-screw oil tanker to motor power, which ship is owned by another company.

However, a few brief remarks concerning the North British Diesel Engine Works will not be without interest. It was formed in 1913 by the de Rothschilds, Lane & McAndrew and by other equally important interests, to build Krupp-Diesel engines; but, when war broke out in August, 1914, the plant was not completed, so the original project was abandoned, and it was decided to build a Diesel-engine of their own design. Their chief designer had had considerable experience with the design and construction of both four and two-cycle marine Diesel-engines and had been to sea in such motorships as the "Jutlandia," "Hagen," "Emanuel Nobel" and "Wotan," so there was no real necessity to work under any license.

However, while the war was on they were obliged to devote their works to the manufacture of shells, bombs, guns, etc., and the construction of steam engines for naval craft. So the only Diesel-engine work carried out was the construction of twelve sets of 240 B.H.P. four-cycle Nelseco-Diesel engines for submarines for the British Admiralty from American designs. But they are now devoting their entire output to merchant marine Diesel engine work, and rank as one of the most important in the United Kingdom. Alongside the works a large concrete fitting-out dock is now under construction, the frontage being 900 ft. long and is served by a 150-ton Giant crane.

The managing-director of the North British Diesel Works is Mr. C. Randolph Smith, a progressive engineering-executive, who formerly was connected with Barclay Curle & Co., and under whose supervision the motorship "Jutlandia" of the East Asiatic Company was built. In fact, it was due to Mr. Smith that Barclay Curle & Co. acquired a license for the Burmeister and Wain Diesel engine, which license afterwards was transferred to Harland & Wolff. One year's guarantee was given with the engine of this pioneer British Diesel vessel, and during that period not $250.00 were spent in outside or builder's repairs.

While at the North British Diesel Engine Co.'s plant, we were enabled to see a twin-screw set of ten-cylinder four-cycle type 3,000 B.H.P. Augsburg submarine Diesel engines, similar to the pair recently despatched to the U. S. Shipping Board. The bore is 21 in. by 21 in. stroke (approx.), and the power is developed at 385 R.P.M. on a weight of 75 tons. We intend to describe this engine in an early issue. Six thousand horse-power on a weight of 150 tons is worthy of a little reflection.

More Motorship Progress on the Clyde

Fifteen Knot Passenger and Cargo Vessel with Beardmore-Tosi Diesel Engines

Among the Clyde firms who have recognized the importance of the heavy-oil engine for merchant-ship propulsion are Messrs. Wm. Beardmore & Co. of Dalmuir, whose big shipyard we recently had the pleasure of visiting. All British naval contracts on the Clyde have just been entirely cancelled and the shipholders have to turn over their entire production to mercantile work. This, of course, has been anticipated for some time. The company in question have been largely naval constructors, and realizing that there exists an immediate future for good four-cycle Diesel-engined cargo and passenger vessels, they recently entered into a license agreement with Mssrs. Franco Tosi, of Legnano, Italy. Not only are they going to build motorships for those who desire them, but are to vigorously push this particular class of merchant ship and point out their advantages over steamers to shipowners. As yet no actual start has been made on the constructional work, as a certain amount of time had to be spent in changing the designs to suit British practice. However, when visiting the Beardmore plant we found that negotiation had practically been concluded with a British shipowning concern for a special type of twin-screw passenger and cargo motorship that is to have a speed of 15 knots. She will not be a large vessel, so the power will be moderate, namely, 2,400 shaft horse-power.

The installation will consist of two Beardmore-Tosi six-cylinder, 25½ in. bore by 37½ in. stroke direct-reversible, four-cycle Diesel engines, each developing 1,200 shaft h.p. at 140 revs. per minute.

Negotiations are under way for a series of twin-screw cargo motor-vessels of 5,000 and 8.000 tons, and these will be fitted with Diesel engines aggregating 2,000 and 3,000 shaft h.p., respectively. The Diesel engine work is under the charge of Mr. James Richardson, who has had very considerable experience with large motorships and Diesel engines. The manufacture of their surface-ignition type marine oil-engine will be carried on as heretofore, but in a separate factory, which was erected for shell production during the war.

SCHNEIDER'S BRITISH LICENSES

Until we published a description of one of their engines, it was not widely known that Sir Wm. Armstrong Whitworth & Co., Ltd., of Newcastle-on-Tyne, England, are licensees for the Schneider two-cycle type marine Diesel engine.

NEW CROSSLEY OIL ENGINE

An oil-engine of moderate compression with solid injection of fuel has been developed by Crossley Bros. of Openshaw, Manchester, England. When developing 129 i.h.p. from a single cylinder a consumption of 0.425 lb. of fuel oil per i.h.p. has been obtained. On coal-tar oil the consumption was 0.475 lb. No pre-heating is required for starting, so the use of a blow-torch is avoided. This design and its mechanical details may be discussed in an early issue.

STEEL COLUMN CONSTRUCTION FOR BURMEISTER & WAIN DIESEL ENGINES

In the three twin-screw sets of eight-cylinder 3,200 i.h.p. Burmeister & Wain type merchant marine Diesel engines now being built by Harland & Wolff, the steel-column system of construction is being adopted, the columns extending through the cylinder covers. It may be remembered that the first Sulzer merchant Diesel engines had columns running through cylinder heads, but this arrangement has been abandoned in their latest models.

HEENAN & FROUDE REPRESENTATIVE IN AMERICA

Now on a business visit to the U. S. A. is Mr. George Black, sales manager of Heenan & Froude, Worcester, England, manufacturers and licensees of the well-known oil engine testing dynamometer of that name.

JAPANESE SUBMARINE CRUISERS

We learn on good authority that the Japanese Admiralty are building, or are about to build, one or more large submarine cruisers. These vessels are to be Diesel-engined and will be larger and more powerfully armed than the British K class Steam-Turbine-Diesel driven submarines, which are of 2,500 tons displacement. Either three 3,000 b.h.p. or three 4,000 b.h.p two-cycle Diesel engines will be installed.

ANOTHER IMPORTANT PIRRIE EXTENSION

Two more large Clyde shipbuilding companies have been acquired by Harland & Wolff through a transaction arranged by Lord Pirrie, namely, the yards of D. & W. Henderson, Ltd., at Meadowside, Partick, and the plant of A. & J. Ingels. Ltd., at Pointhouse. This means that the greater part of shipbuilding on the Clyde now is under the control of Lord Pirrie, and we presume that arrangements will be made to construct motorships at these works as at other Harland & Wolff Clyde yards.

SWEDISH MOTORSHIPS

There are in service today in Sweden no fewer than 410 commercial motor vessels, excluding fishing craft, aggregating 81,841 tons. Nine motorships aggregating 2,280 gross tons were placed in service during May, 1919.

BURMEISTER & WAIN ENGINE TO BE BUILT IN GERMANY

An exclusive license to build the Burmeister & Wain merchant marine Diesel engine has been secured by the Deutsche Oelmaschinen G. m. b. H. This concern appears to be a branch or a reorganization of the company started by the A. E. G. and the Hamburg-America Steamship Co. to build Junkers-Diesel oil-engines during the war.

HIGH-POWERED GERMAN DIESEL ENGINES FOR AMERICA

Two new German submarine-type Diesel engines of 3,000 shaft h.p. each have been shipped to the U. S. Shipping Board from Cammell-Laird's yard at Liverpool. These engines are 38 ft. long, 11 ft. high and 5 ft. wide, and weigh 76 tons apiece. Two German engines of 900 shaft h p. also have been shipped to the Brooklyn Navy Yard from the Wallsend Shipway & Engineering Co. of Newcastle-on-Tyne. It is likely that a German submarine Diesel engine of 1,750 h.p. will be shipped very shortly. This engine weighs 45 tons, and is 28 ft. 8 in. long.

Generated on 2024-09-13 14:27 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The New Werkspoor Engine

First Details of Recent Changes, Including New Reversing Mechanism, That Have Been Made in This Well-Known Holland Marine Diesel Engine

Amsterdam, October 9th, 1919.

When Capt. G. L. Carden was sent by the United States Government on a visit of inspection to the leading engineering plants of Europe just before the war, he was enabled to see several works where Diesel engines are constructed, including the Werkspoor factory at Amsterdam, and in his official "blue-book" report he said: "I need have no hesitation in saying that the class of workmanship at the Nederlandsche Fabriek (Werkspoor) is unexcelled anywhere in Europe." During our trip of nearly four months in eight countries we too visited many plants and our views after going through Werkspoor's works were the same as those of Capt. Carden, which means that despite adverse war conditions and higher production costs they have maintained the same high standard of engineering existing prior to 1914.

Including the Werkspoor railroad car factory at Utrecht, about 2,500 men are employed at the present time, and the plant is now choc-a-bloc with castings and forgings in the various stages of machining, especially the Diesel engine department. In fact, so busy is the latter shop that some stationary Diesel engines of 1,200 h.p. are being built for them by the Bofors Company in Sweden, while the heavy parts of the 1,300-1,450 i.h.p. Diesel engines for two British-built motorships are being constructed for them by the North Eastern Marine Engineering Co., Wallsend-on-Tyne. Both concerns are Werkspoor licensees.

During the war Werkspoor has suffered very heavily through inability to obtain materials. Large supplies were purchased in America and England, but they were unable to get them shipped, consequently from 1915 until early 1919 not a single marine Diesel engine was completed, and it was only a few months ago that they were able to deliver the first engines of the new design. At the present time their Diesel-engine orders will keep that particular department busy for at least two years, and the number of orders on hand is only limited by their output, they having had to refuse many orders. When at their plant we met a Norwegian business man who had driven in his Franklin automobile from Christiana solely for the purpose of inducing Werkspoor to take on additional orders for ships' Diesel engines. Whether he succeeded we do not know at the time of writing. Incidentally, we may mention that he averaged 40 m.p.h. for the entire distance which is rather fast driving, and speaks well for this American car.

On the day of our visit the following marine Diesel engine orders were on Werkspoor's books:

Name of Ship.	D.W. Cap.	Owner.	Power.
"Salerno"	6500 T.	Otto Thorensen, Christiana	2600-2900 I.H.P.
"San Miguel"	3050 T.	Otto Thorensen, Christiana	1300-1450 I.H.P.
"Sardinia"	3000 T.	Otto Thorensen, Christiana	1940-2140 I.H.P.
"San Andreas"	3000 T.	Otto Thorensen, Christiana	1940-2140 I.H.P.
"San Paulo"	6500 T.	Otto Thorensen, Christiana	1940-2140 I.H.P.
"Athene"	6600 T.	Salversen & Co., Kragero	2600-2900 I.H.P.
"Geisha"	7000 T.	Winge & Co., Christiana	2600-2900 I.H.P.
"Tosca"	7000 T.	Winge & Co., Christiana	2600-2900 I.H.P.
"Aida"	7000 T.	Winge & Co., Christiana	2600-2900 I.H.P.
Unnamed	2200 T.	Otto Thorensen, Christiana	1300-1450 I.H.P.
Unnamed	2200 T.	Otto Thorensen, Christiana	1300-1450 I.H.P.
11 ships	54050 T.	3 owners	22720-25270 I.H.P.

In addition Werkspoor are building 34 Diesel engines for the engine-room auxiliaries of these ships. It will be noticed that seven of these motorships are for one shipowner, which well illustrates the enthusiastic and serious attitude that Scandinavian owners have taken towards motorship construction. Some of these vessels will have a speed of 14 knots.

The "San Paulo" and others are being built by the Rykee Shipbuilding Co., Rotterdam, while the "Salermo," "Sardinia," "San Miguel" and the "San Andreas" all are on order with J. & K. Smit, Kinderdyk, near Rotterdam. The "Geisha," "Tosca" and "Aida" are under construction at the yard of the Netherlands Shipbuilding Co., Amsterdam, which is adjacent to the Werkspoor works. The two unnamed vessels are being built by Wood & Skinner of Bill Quay, Newcastle-on-Tyne, England.

Having given details of the orders on hand, we can turn attention to the new design of Werkspoor engine, and we think that the illustrations, which have not previously been published in any journal, will be of unusual interest, as the new design shows great improvements over previous models, and has resulted in a marine engine which undoubtedly will hold its own in the shipping world. Especially is the new reversing mechanism of interest, as we doubt if it will be possible to produce a more simple arrangement during the next few years, and compared with the old double cam-shaft arrangement an expensive structural cost is saved, apart from the added ease of maneuvering.

Unfortunately we left in Amsterdam an excellent "close-up" photograph of the eccentric valve-rocker, which we hope to receive by mail in time for inclusion in the next issue. However, the illustrations, which we now give, will give a comprehensive idea of the reversing arrangements.

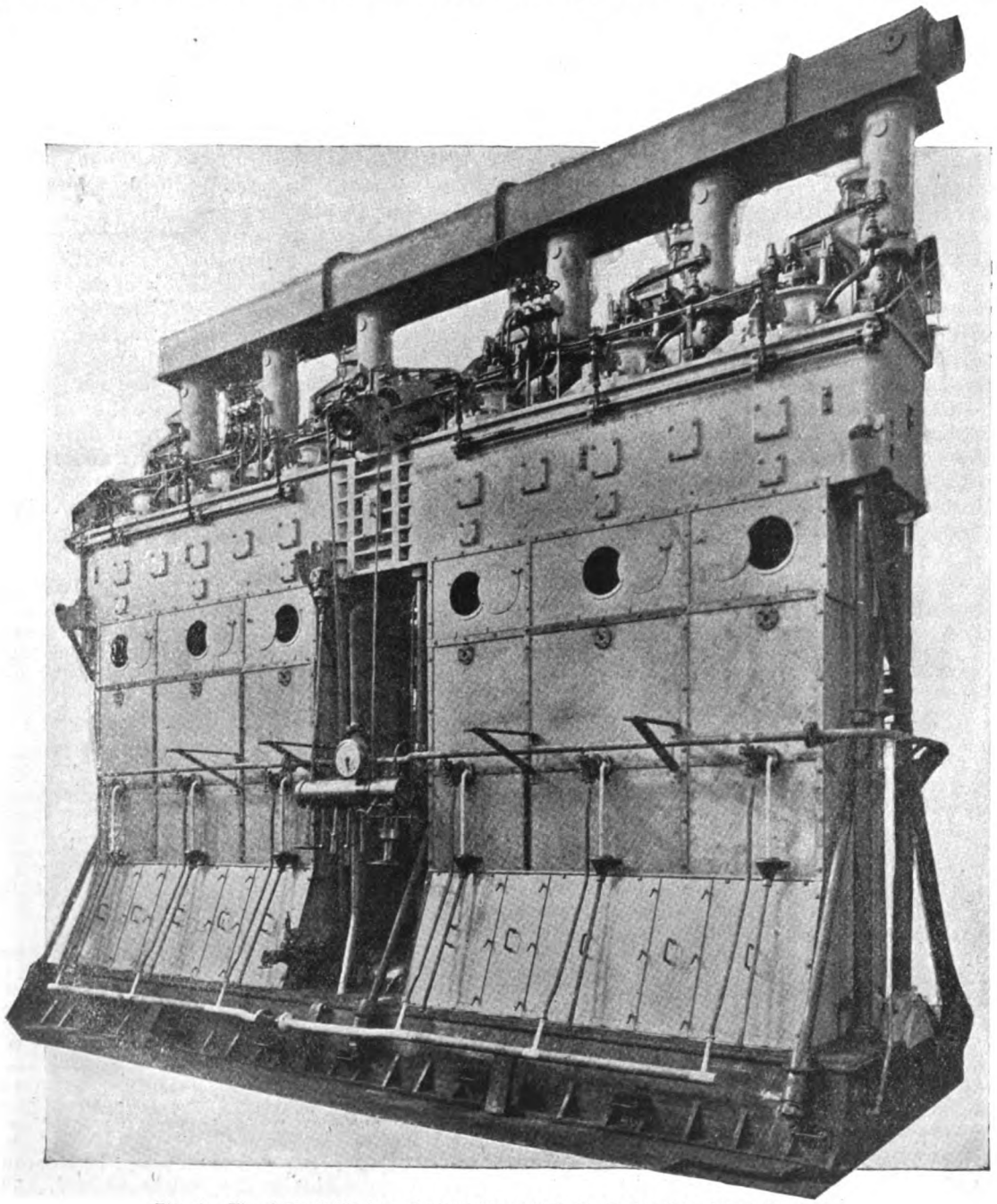


Fig. 1. The Latest Design of Werkspoor 1450 H. P. Marine Diesel Engine.

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The largest single engine under construction is of 1,940 to 2,140 indicated horse-power in six cylinders, 26.378 ins. diameter by 47.244 ins. bore at 110 revs. per minute on a weight, complete with flywheel and thrust-block of 180 tons and a length of 33 ft., 11½ ins. without flywheel and thrust-block. If a Kingsbury or Mitchell thrust is adopted, it means that the length for this power will only be about 40 ft., so that **the saving in both weight and space** will be very considerable compared with geared-turbines, boilers, condensers, and boiler-water. We estimate that the weight-saving outlined above will be in the neighborhood of 300 tons, which at once exposes the fallacy unfortunately existing among some shipowners that Diesel engines are heavier than the latest types of steam machinery. The **guaranteed** fuel-cosumption is 0.33 lb. per i.h.p. hour, which exceeds the actual consumption under general ocean-going conditions, but of course the builder must retain a reasonable margin.

However, the engine which we illustrate is a little smaller in size, having an output of 1,280-1,400 indicated horse-power (910-1,020 shaft h.p.) at 125 revs. per minute on a weight complete of 120 tons, and a overall length without flywheel and thrust of 29 ft. 4¼ ins. It is of the four-cycle, single-acting, direct-reversible type with six cylinders 22.047 ins. diameter by 39.370 ins. stroke, the rated power being produced at a mean indicated pressure of 6.25 kg. per sq. centimeter (89.2 lb. per sq. in.), giving a mechanical efficiency of 72 per cent. The guaranteed fuel-consumption of this engine also is 0.33 lb. per i.h.p. In general its design is the same as the larger engine just referred to, so the description applies to both machines.

Reference to the illustrations will show that the engine is very "clean" in design and free from that mass of complicated fittings and piping, occasionally found on some designs of marine engines. While it is of open construction, the engine is entirely enclosed by oil-tight steel plates that can be removed when desired in a very short time, rendering every part accessible. This is one of the improvements over the old design, with which the working-parts were covered by splash-plates that did not effectively prevent the oil being thrown out, resulting in dirty engine-rooms if the engineers-on-watch were at all lazy and careless. Furthermore, it has permitted the installation of a force-feed system of lubrication to the main-bearings and cross-heads, as well as to the cylinders and pistons. It is hardly necessary to mention that every merchant type Diesel marine-engine built by Werkspoor, with the exception of engine-room auxiliary motors, has been of the cross-head-and-guide type. In fact they were the first to build marine Diesel engines with cross-heads, a practice now followed by nearly every maker with slow-speed engines of five or six hundred horse-power and over, although there are some builders who consider that crosshead construction is unnecessary in powers below 1,000 h.p. This question, of course, cannot be discussed in this particular article.

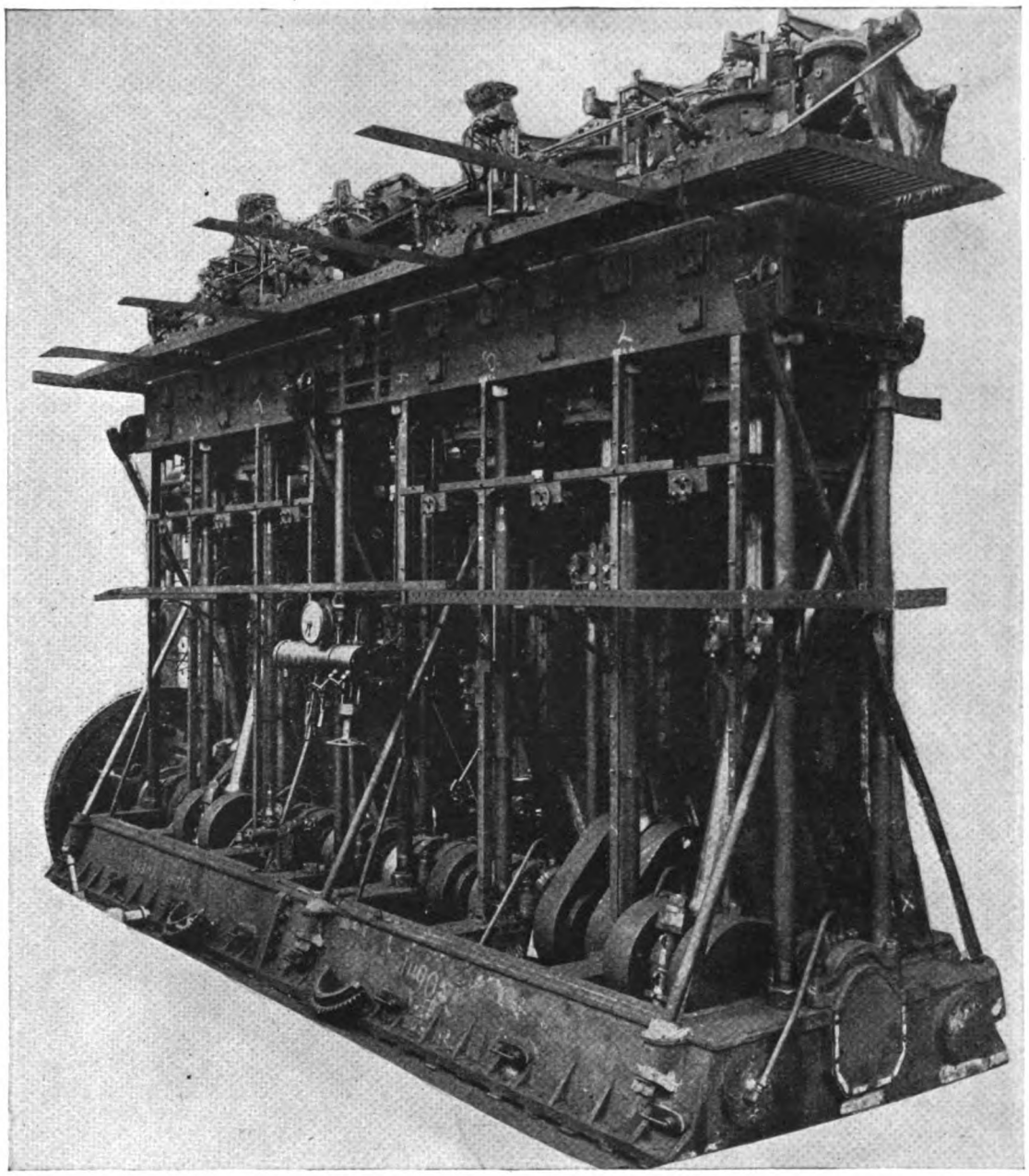


Fig. 1a. The same Engine as in Fig. 1 But With the Oil-Tight Splash-Plates Removed To Denote Its Excellent Accessibility. The Cast-Iron Column Can Be Seen At The Back of The Engine.

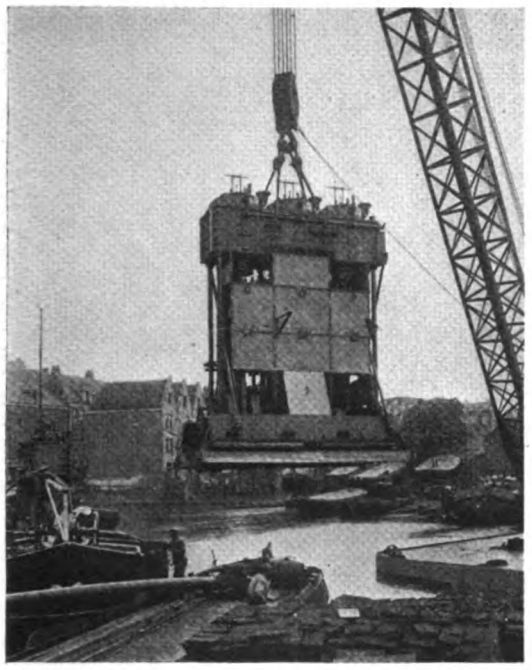


Fig. 2. Lowering a Half of a Werkspoor 1400 H. P. Marine Diesel-Engine Into a Barge

The vertical steel column construction, braced by the diagonal steel columns and supported by the cast-iron columns at the back of the engine, have been retained as the principal feature of the design, and in the case of a twin-screw ship the two engines are connected at the top by steel girders from one cylinder-box to the cylinder-box of the other engine, which results in a very stiff marine set with freedom from vibration. Fig. 3 very clearly illustrates this composite construction, which first was adopted by Werkspoor in 1911 with the engine of the tanker "Juno," which was of about the same power.

Perhaps it is the most radical change, namely the reversing-mechanism, that will be of the greatest interest to marine engineering men, particularly Diesel engine designers, as the new device enables the engine to be reversed as easily as a two-cycle motor and quite a little quicker than most Diesel engines of the latter type from full-ahead to full-astern. The time is from five to ten seconds according to the smartness of the engineer-in-charge. This new reversing system is being fitted on Werkspoor engines now under construction in the United States, and its operation is clearly depicted by Figs. 4, 4a and 4b.

It may be remembered that with the previous Werkspoor design there were two camshafts carrying the ahead and astern cams respectively, and when it was required to reverse the engine, the entire set of shafts and cams were moved forwards and backwards, as the case may be, on sliding brackets, bringing the desired set of cams under the rollers of the valve rockers.

With the latest device referred to there is only one camshaft and this does not move except to continuously rotate at half engine-speed. In fact it remains stationary while the reversing operation is performed, and merely serves the purpose of

Generated on 2024-09-13 14:25 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

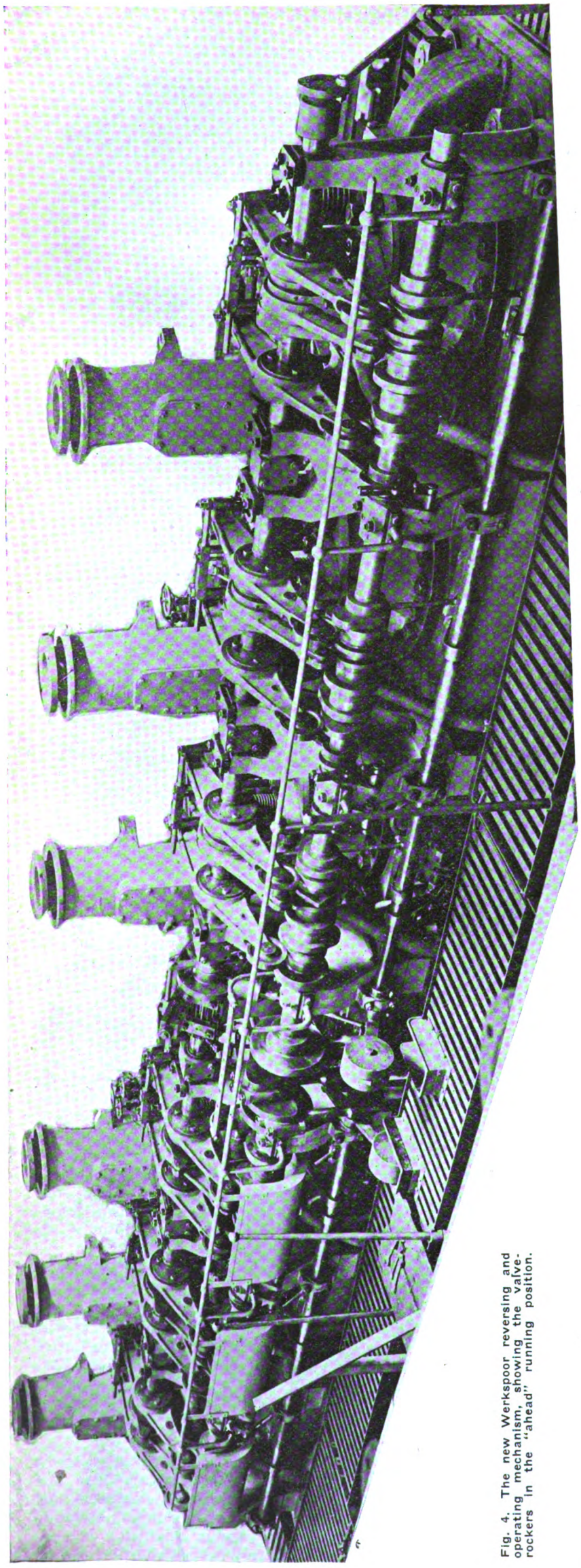


Fig. 4. The new Werkspoor reversing and operating mechanism, showing the valve-rockers in the "ahead" running position.

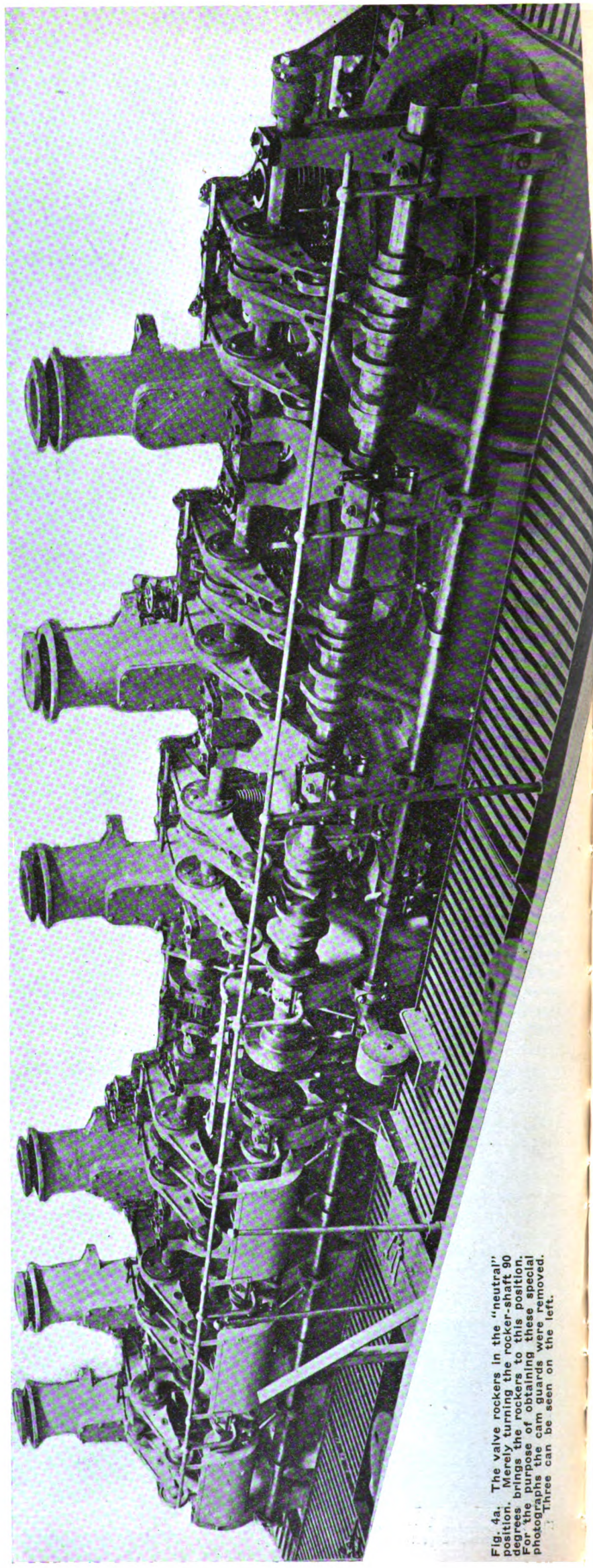


Fig. 4a. The valve rockers in the "neutral" position. Merely turning the rocker-shaft 90 degrees brings the rockers to this position. For the purpose of obtaining these special photographs the cam guards were removed. Three can be seen on the left.

Digitized by Google
Original from UNIVERSITY OF MICHIGAN
Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

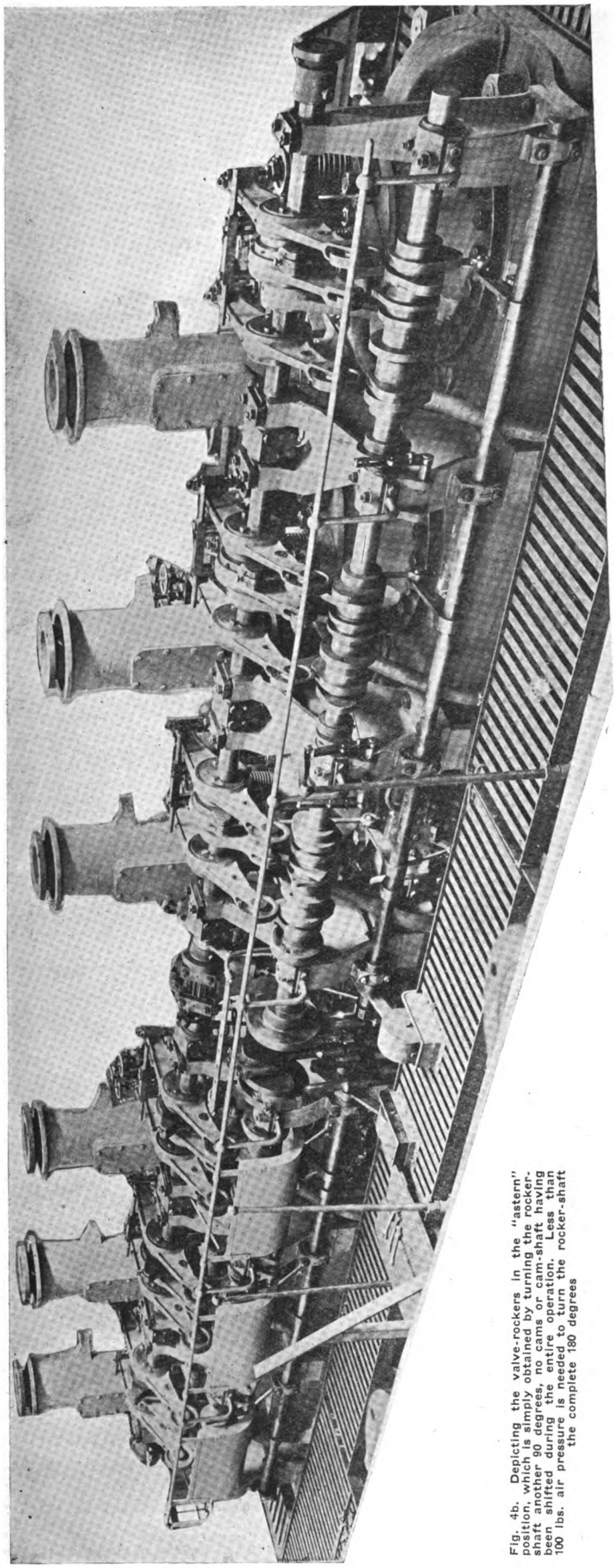


Fig. 4b. Depicting the valve-rockers in the "astern" position, which is simply obtained by turning the rocker-shaft another 90 degrees, no cams or cam-shaft having been shifted during the entire operation. Less than 100 lbs. air pressure is needed to turn the rocker-shaft the complete 180 degrees

carrying two sets of fixed cams that are rigidly secured on it. Incidentally we may mention that Werkspoor's practice of using cast-iron for the inlet and exhaust cams is still retained. Nine years of seagoing experience have demonstrated that this is the best material for the purpose, and our own personal experience with some naval oil-engines in 1907-1908 confirms this view. The surfaces of the rollers, of course, are chilled, and after several years of continuous work the toolmarks remain on the cams. For small high-speed cam-rollers we consider manganese-bronze the best material.

All the reversing motions are carried out by the valve-rockers, and like all eccentric movements the action is very peculiar yet exceedingly simple, and at this stage of the description we suggest a study of Figs. 4, 4a and 4b and Fig. 5. It will be seen that there are four rockers per cylinder, for the inlet, exhaust, air-starting and fuel valves respectively. Each rocker is mounted on a diagonal-eccentric the eccentric being secured to the shaft and is free to move in the hub of the rocker. To shift the rocker rollers from one cam to another it is merely necessary to rotate the rocker-shaft 180 degrees, in the neutral position at 90 degrees the rollers are clear of the cams. The turning of this rocker-shaft requires very little effort, and actually can be done by hand. But, to facilitate the operation, a little double-acting air-engine with an oil-cushion is provided and this reciprocates a ratchet (see B in Fig. 5) that is in connection to a ratchet-wheel on the rocker-shaft.

In the illustration the teeth of the ratchet cannot be seen as they are on the lower side of the steel block (B). The ratchet wheel, however, can be seen in Fig. 4, between the two sets of three cylinder heads. It will be realized that when the valve-rocker moves from the ahead-cam to the astern-cam the position of its valve-tappet and also changes, and this is arranged for by the provision of a double head, or tappet, with an adjusting screw on each. The setting of the rocker-rollers is so arranged that when running "ahead" the roller-face is square on the cam, but in the "astern" position the face of the roller is not absolutely square on the cam, it resting at a slight angle, which is of no consequence because the wear of the astern position is exceedingly slight, partly owing to the very limited periods during which the engine runs astern and partly because of the large size of the roller.

Of course, it would be possible to design the faces of the rollers and cams whereby they would rest quite square on their surfaces in both ahead and astern positions, but this the Werkspoor designers things entirely unnecessary, as very satisfactory results are obtained with the way they now are arranged. To operate the camshaft the old system of long hollow rods and cranks which pull and not push has been retained, no trouble ever having occurred from this source with any engine, also the movement is unusually silent and free from vibration.

There has been a slight change to the bed-plate, which has been made for manufacturing purposes in order to facilitate the work of making the casting in the foundry. Bed-plate details are clearly shown in Figs. 2, 3 and 6.

Generated on 2024-09-13 14:06 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

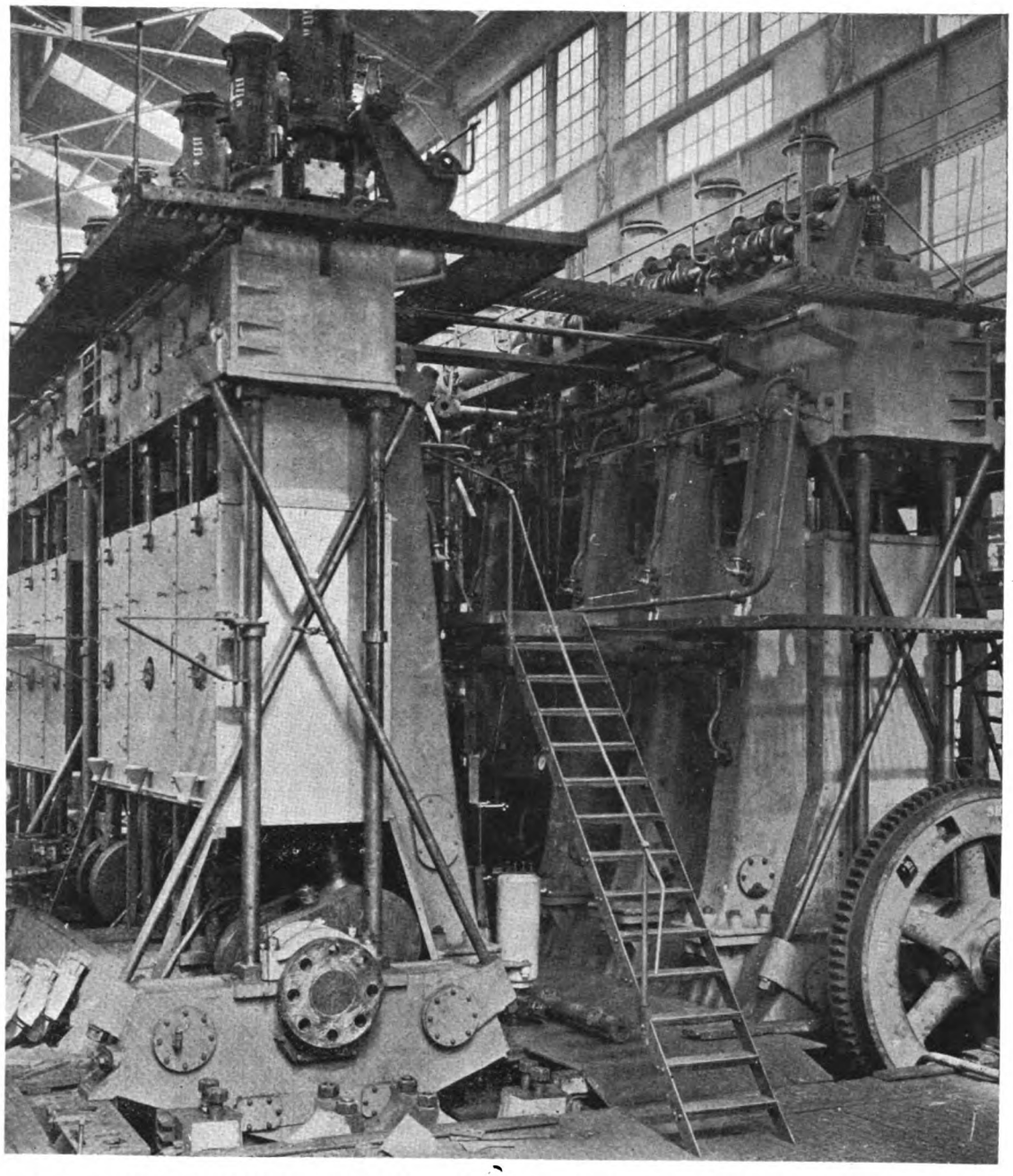


Fig. 3. This well illustrates the combination of vertical and diagonal steel columns and cast-iron columns which form prominent features of the Werkspoor design. Additional rigidity is obtained by bracing the two engines together. Some of the oil splash-plates are shown removed to denote accessibility.

effectively cooling the cylinders. Perhaps a better idea of the construction will be obtained from Fig. 6a, which shows the vertical steel columns, that pass clean through the box and hold it in position, as well as absorbing the strains of compression. The upper parts of the cast-iron columns rest against the back of these boxes and take up any lateral movement of the engine that may not already be absorbed by the diagonal steel-rods (see Fig. 3), which run from the lower part of the cylinder-boxes to the bed-plate.

A new system of piston-cooling has been incorporated, whereby a series of "cups" in hollow telescopic-tubes pick up the sea-water and throw it into the pistons. These telescopic-tubes have no stuffing boxes or glands and do not touch each other, so there is no friction.

As regards the remainder of the engine, this, generally speaking, follows previous models built by Werkspoor, the features of which have given good service under severe sea-going conditions, so have not been altered. Therefore there is no necessity to describe them in this article, as they may be found in previous issues of this journal. We may mention that the foregoing description should be of value to American shipowners, as Werkspoor Diesel engines are now being built in the United States, including two engines for a new motorship for the Standard Oil Co. of California. Altogether four American firms now control constructional licenses.

ADMIRAL-OF-THE-FLEET LORD FISHER AND THE MOTORSHIP.

Economy is the Soul of Efficiency—Lord Fisher. *Motorships Mean Economy and Therefore Efficiency.*—Editor of "Motorship."

Lord Fisher, the Admiral of the Fleet of the British Navy, has been contributing a series of frank, but very interesting, articles to the London "Times," and he shows no hesitation in calling a spade a spade, or a man a damned fool, an ostrich and a rabbit for not believing that the Diesel oil-engine is revolutionizing merchant and naval shipping. Here are some of Lord Fisher's remarks:

"I have beliefs—some beliefs have to be like Resurrection, they require Faith—our stu-

Reference also might be made to another minor change which in a way is not of a little importance. In the old design of engine there was a square cast-iron tray under each cylinder through which the piston-rod passed in a stuffing box. The object of this tray was to keep carbon deposit that falls from the cylinder and any salt-water leaking from the piston-cooling system, from out of the crankcase. But in actual practice at sea the dirt and water sometimes overflowed and found its way below.

These cast-iron trays have been replaced by a long steel-plate tray shown at (c) in Fig. 8, which affords complete protection to the crank-pit. The detachable cylinder extensions have been retained, and they can be seen in the same illustration. To inspect or remove the pistons or piston-rings it is only necessary to lower these extensions, thus providing a rapid method of piston removal, which for speed and simplicity has not yet been bettered.

Reference to the same illustration also will show the cast-iron cylinder-box or beam, of which there are two per engine, each virtually forming a tank of cooling-water, both boxes carrying three cylinders. This casting assists to make the engine rigid and to prevent vibration as well as

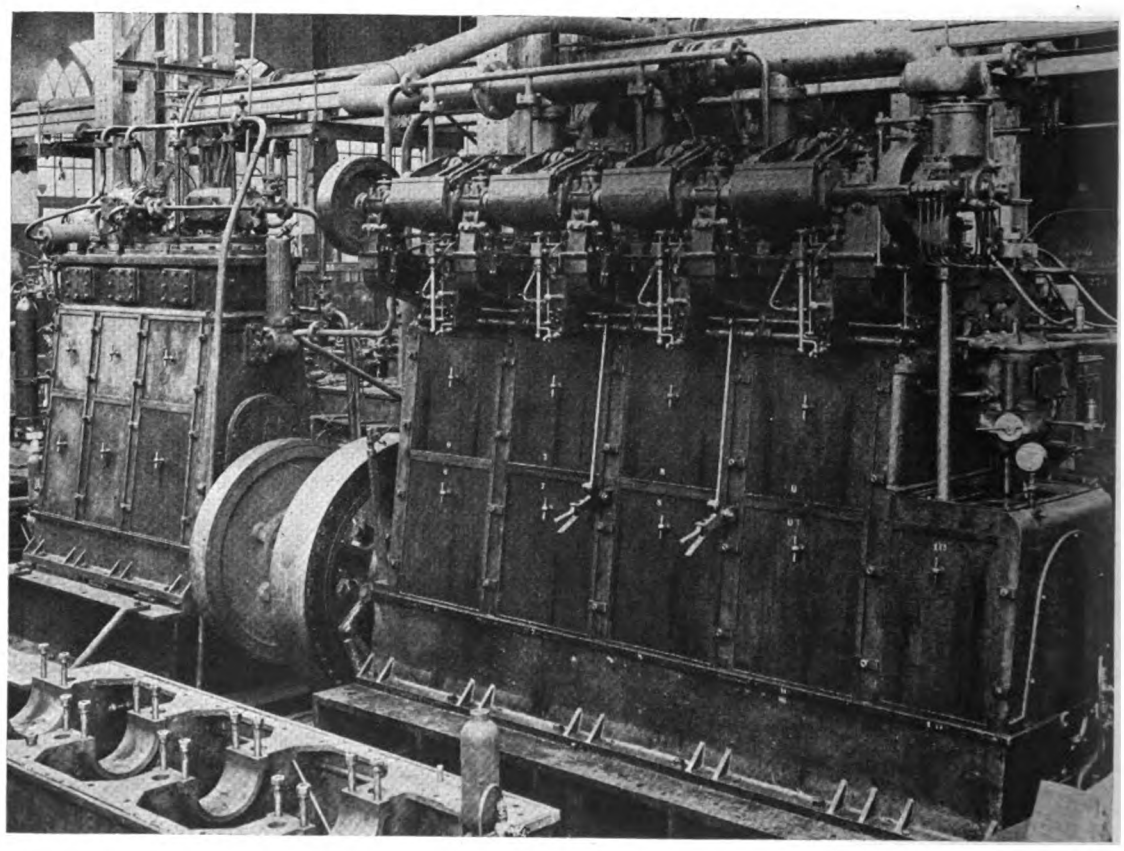


Fig. 3a. Two Werkspoor engine-room auxiliary Diesel engines of the very latest design

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

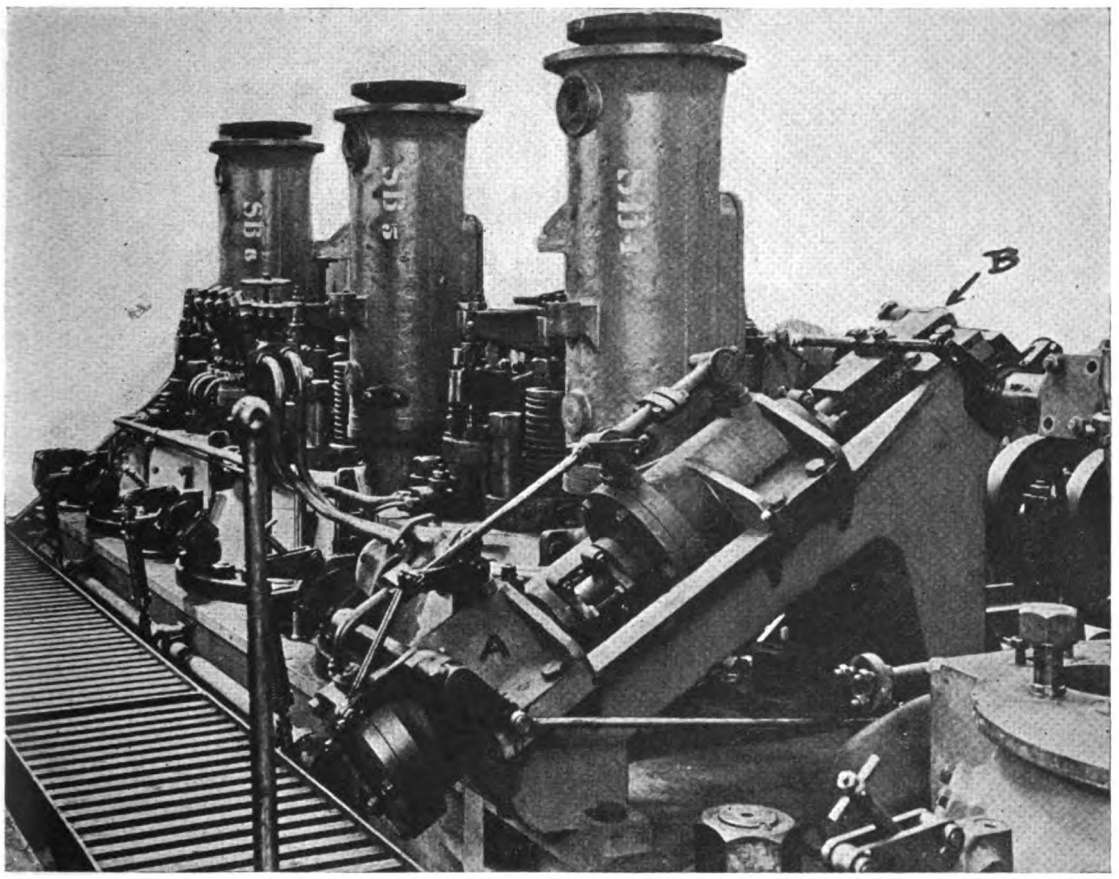


Fig. 5. The little compressed air-engine (A) which actuates the ratchet (B) that turns the valve-rocker shaft the 180 degrees necessary for the reversing movement of the Werkspoor engine

pid people do not believe in the internal combustion engine, or in oil. I have faith in both. Those two are not only going to revolutionize sea war, they are going to revolutionize sea commerce, for ample and convincing reasons which I shall set forth in my book. I should at first build not necessarily fighting vessels, I should build tramps to carry oil, with ever improving internal combustion engines fitted in them."

"The future of sea war and the future of sea commerce absolutely rest on the internal combustion engine, and the internal-combustion engine cannot exist without oil."

"In the internal-combustion ship doubtless, till our knowledge of metallurgy is increased, we can only have cylinders of such size as will necessitate a great number of engines; but, again, we get the valuable advantage—that if one engine goes wrong there are 99 left." (Apparently Lord Fisher has some form of Diesel-electric propulsion in mind—Editor "Motorship.")

"Air fighting dominates future war, both by land and sea. It is not my business to discuss the land, but by sea the only way to avoid air is to get under the water. So you are driven to the internal-combustion engine and oil. That's why I keep on emphasizing that the whole Navy has to be scrapped. For nearly a whole year after the Armistice we are spending 140 millions sterling on a scrapped Navy.

"Get rid of the spendthrift crew! Scrap the lot! Stop the money!"

"When I left the Admirality on January 25th, 1910, there were 61 efficient submarines and 13 were building. When I returned to the Admirality in October, 1914, there were only 51. So I sent for Mr. Schwab, of the Bethlehem Steel Works, and he delivered a batch of submarines in five months, an unprecedented feat, as 14 months was the record till then. These 'H' type submarines, built by Schwab, were unconvoyed from America to the Dardanelles and acted there prodigiously. Mr. Schwab should have been made a duke. If any man ever deserved the gratitude of England, Mr. Schwab is the man.

"This British nation is going to make the same silly mess over the internal-combustion engine, which is just as imperative for commerce as for war. Every nation except ourselves is pushing ahead with this engine. Its commercial value is incalculable."

Commenting on Lord Fisher's remarks, Sir Marcus Samuel says:

"Lord Fisher is equally right and far-sighted when he predicts that the internal-combustion engine will entirely supersede steam for the propulsion of vessels. The only question is, will it take him as long to convince those who in his own inimitable language, he describes as ostriches and rabbits, as it did to bring about the change from coal to oil? I hope not, but—experientia docet."

STANDARD OIL CO. ORDER WERKSPOOR DIESEL ENGINED TANKER

Motor Vessel of 2,800 Tons D.W.C. Building on Pacific Coast.

As mentioned in a recent issue there is under construction for the Standard Oil Company of California at the Works of the Union Construction Company, Oakland, California. She will be a two-decked steel twin-screw tanker with Diesel propelling machinery equipped with electric auxiliaries throughout, and fitted for carrying refined-oil in bulk, and package freight in the cargo hold forward.

The principal dimensions are as follows:

Dead-weight capacity	2,800 tons
Length overall	262′ 0″
Length between perpendiculars	250′ 0″
Breadth, moulded	37′ 0″
Depth, moulded	21′ 0″
Loaded Draft	17′ 0″

This vessel will have a capacity of 16,000 barrels (42 gallons) of refined oil in cargo tanks, 2,700 barrels (42 gallons) of fuel in bunkers, 44.5 tons of fresh water in after peak and fresh water tanks, and 15,000 cubic feet of cargo space in forward hold.

Cargo piping and pumping equipment will be so arranged that three different grades of oil may be carried in cargo tanks, which can be filled or pumped out simultaneously without mixing. Winches and cargo booms are fitted for rapid handling of package freight in cargo hold.

Her machinery is located aft, where there will be two main engines of the Skandia-Werkspoor crosshead-construction Diesel type, each of 550 b.h.p., running at 165 r.p.m. This power should be capable of driving the vessel at an estimated speed of 11.25 knots, when loaded to 17′ 6″ mean draft. These engines are now being built at the Skandia Works in Oakland, California.

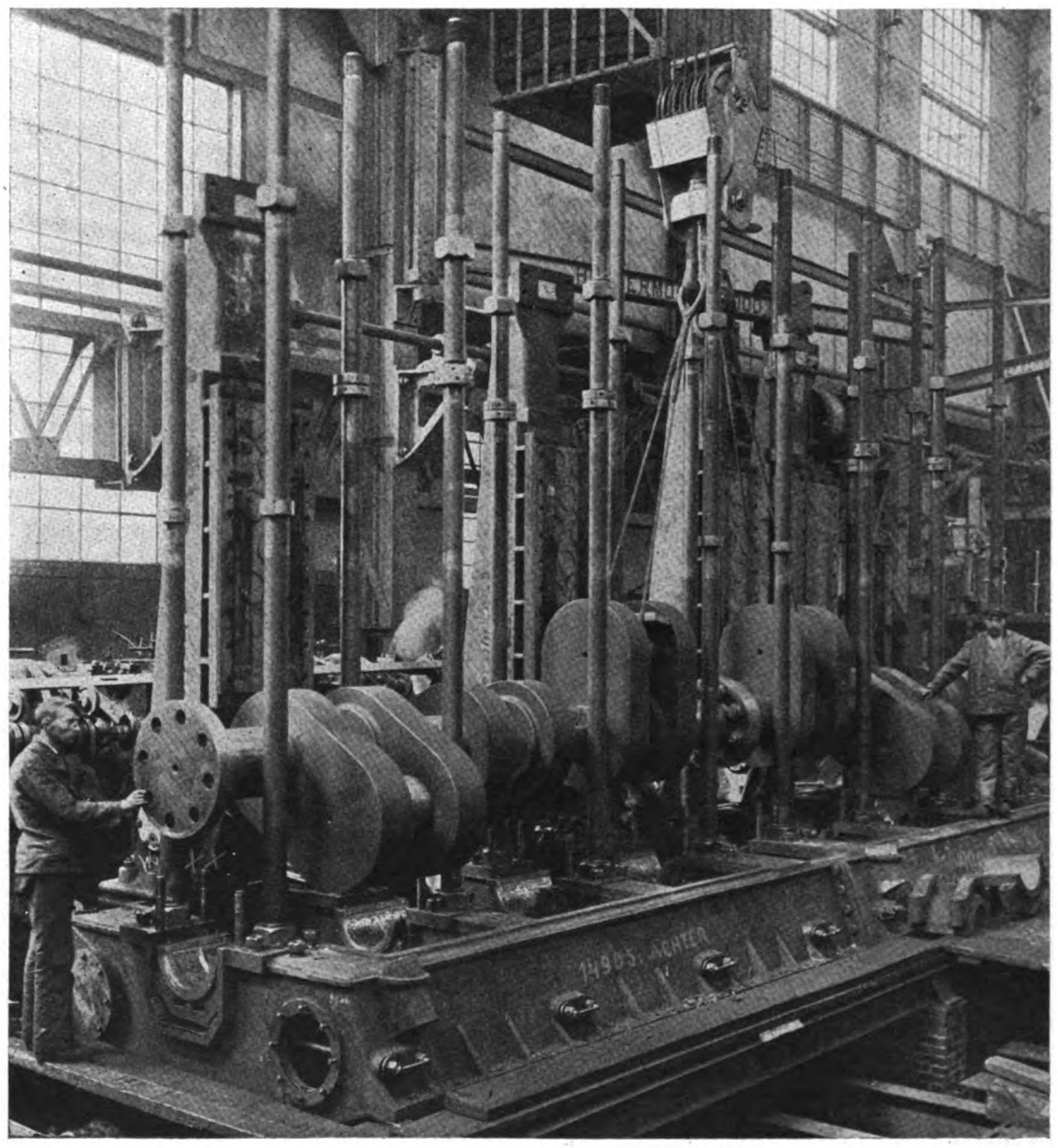


Fig. 6. Erecting a Werkspoor engine. Lowering the built-up crankshaft onto the main bearings. Note the new form of bed-plate construction

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The electrict auxiliary power plant will consist of two 150 b.h.p. Dow-Diesel engines, direct-connected to two General Electric direct-current generators, each of 100 k.w. 250 volts, running at 250 r.p.m. There will also be 10 k.w. oil-engine driven emergency generating set, and a small rotary converter, the latter being required to obtain 125 volts for lighting.

All auxiliary machinery is electric-motor driven, including pumps and compressors in the engine room; also the entire pumping equipment, ventilating fans, ice machine, cargo winches, capstans, anchor windlass and steering gear.

In the bridge house amidships will be provided quarters for deck officers, while the engineers' quarters, messrooms and galley are to be located in the deck house aft. The deck and engine room crew will have their quarters below the poop-deck aft, with two men to each room.

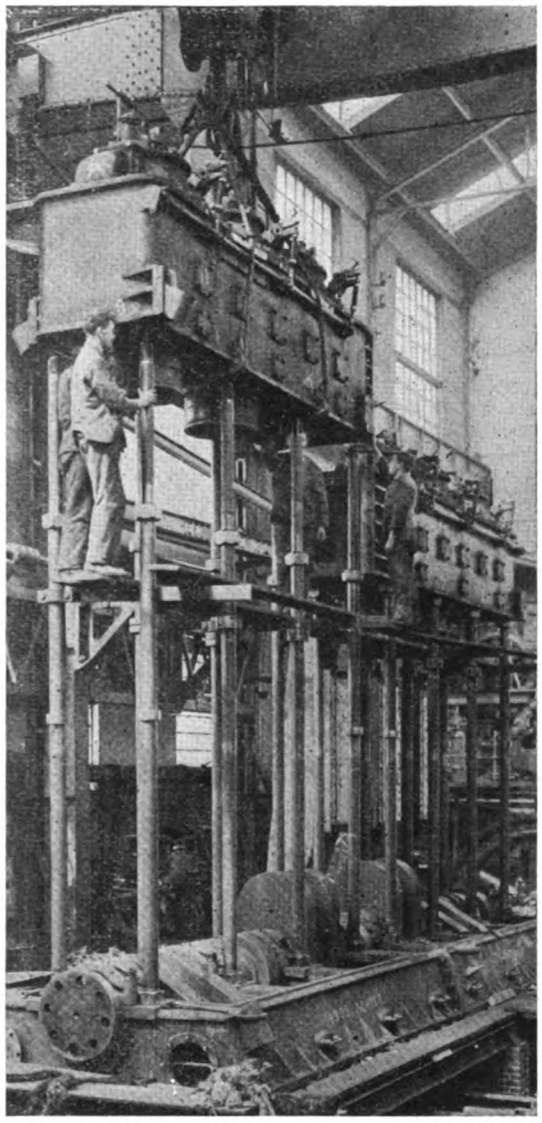


Fig. 6A. Erecting a Werkspoor engine. Placing the cylinder boxes into position. The cast-iron columns and steel diagonal-rods are not shown.

All staterooms will be electrically heated and lighted and the quarters under the deck aft are to be fitted with forced ventilation through an air duct on either side of ship. Individual branches will be fitted with a damper in each room and fresh air will be supplied by a blower drawing from above deck.

All galley equipment will be electric, consisting of range, broiler, griddle, coffee urns, and fresh water heater.

Shower baths will be fitted throughout, for hot salt water, which will be taken from the circulating-water overboard-discharge from the main engines, thus utilizing at least some of the heat carried away from the engines.

A small oil-fired donkey boiler will be fitted for steaming out oil tanks, and will be so constructed that it may also be used as an evaporator for distilling salt water for ship's use.

The vessel will also be equipped with wireless outfit and submarine signaling apparatus.

"TANJONG RHU" AND "TANJONG KLING"

"Tanjong Rhu" and "Tanjong Kling" are the names of the two 2,500-ton deadweight motorships that have recently been built at Singapore by the Anglo-Chinese Shipping Company. In both vessels two 350 shaft h.p. Skandia surface-ignition oil-engines are installed.

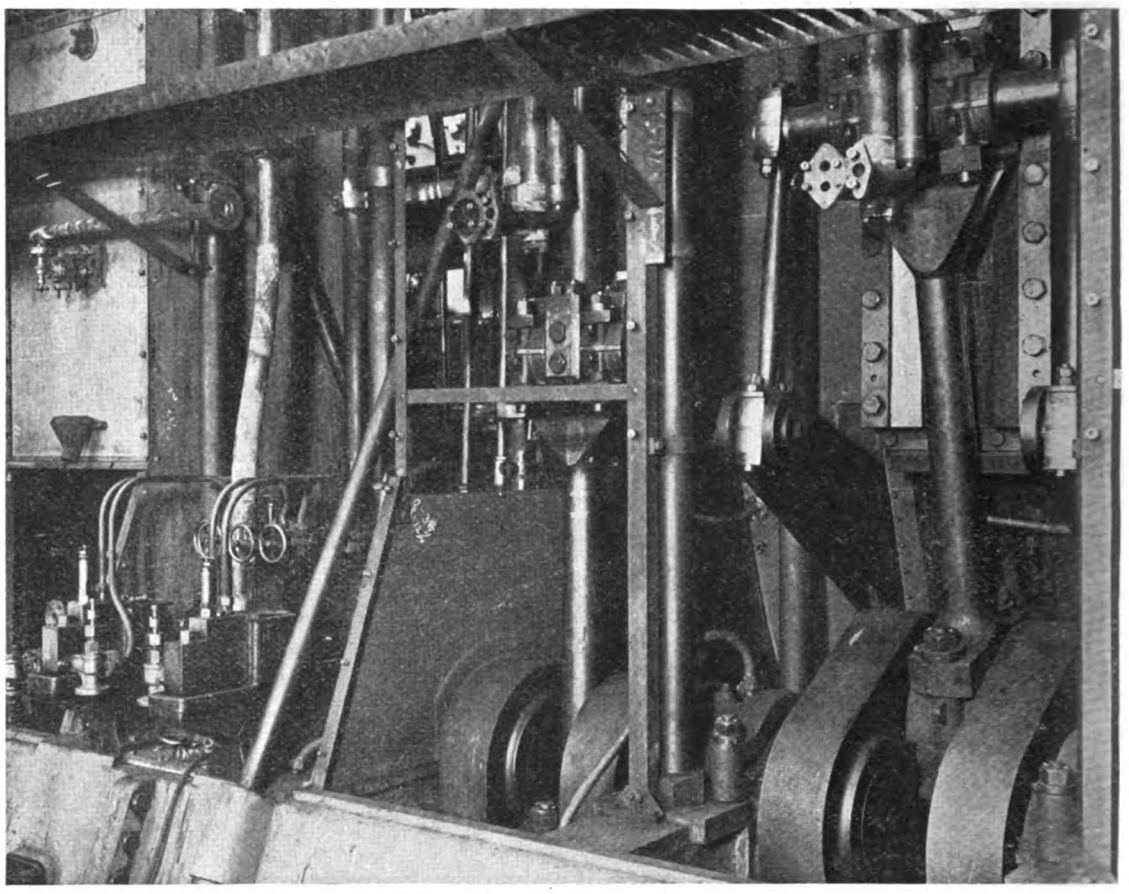


Fig. 7. Crosshead & guide construction detail of the new Werkspoor engine

THE S.S. "ROTTERDAM" AND HER DIESEL ENGINES

Our return voyage from Europe was made on the S.S. "Rotterdam" of the Holland-American Line, and we can recommend her as being one of the most comfortable and steadies liners on the Atlantic ocean to-day, although she is rather a slow boat, only averaging between 15 and 16 knots. All her officers, stewards, etc., are unusully courteous and attentive. She has installed on her after deck an equipment that every vessel—freighter or liner—should carry, namely an oil engine-driven emergency wireless and electric-lighting set. The engines are two four-cylinder four-cycle type Diesels of 36 i.h.p. each. Her main steam engines are of the reciprocating type and owing to bad coal she has considerable difficulty in making her speed going west, illustrating the need for large shipowning companies to appropriate money for the purpose of developing the marine crude-oil engine in high powers.

IN THE CAMP OF THE "RIVAL"

It is not known for certain, but we are rather suspicious that our "friendly enemies" are with us in spirit at least. There is a rumor about that a prominent geared-turbine manufacturer is about to develop a marine Diesel engine. Also, at least one of the firms that have been and are supplying *steam* machinery for the recent government shiubuilding program are simultaneously developing a Diesel engine for merchant ships.

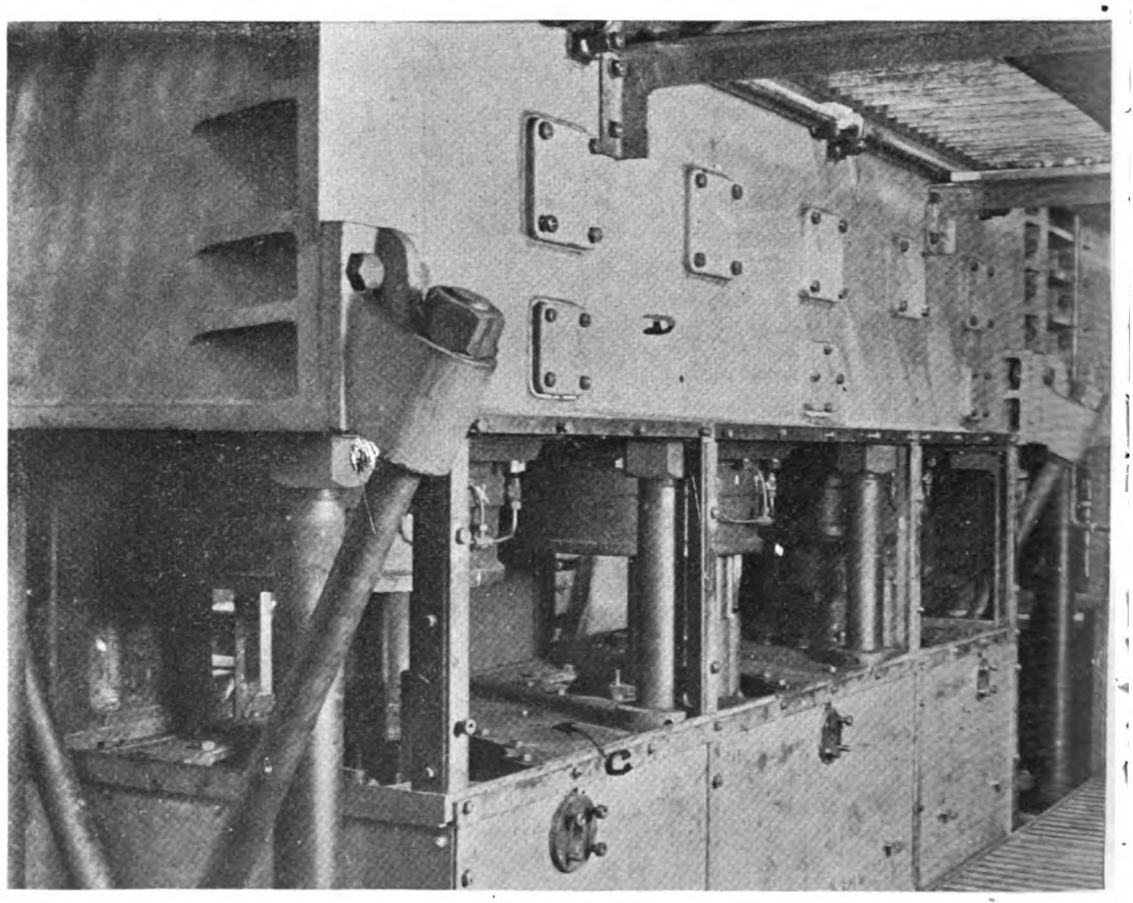
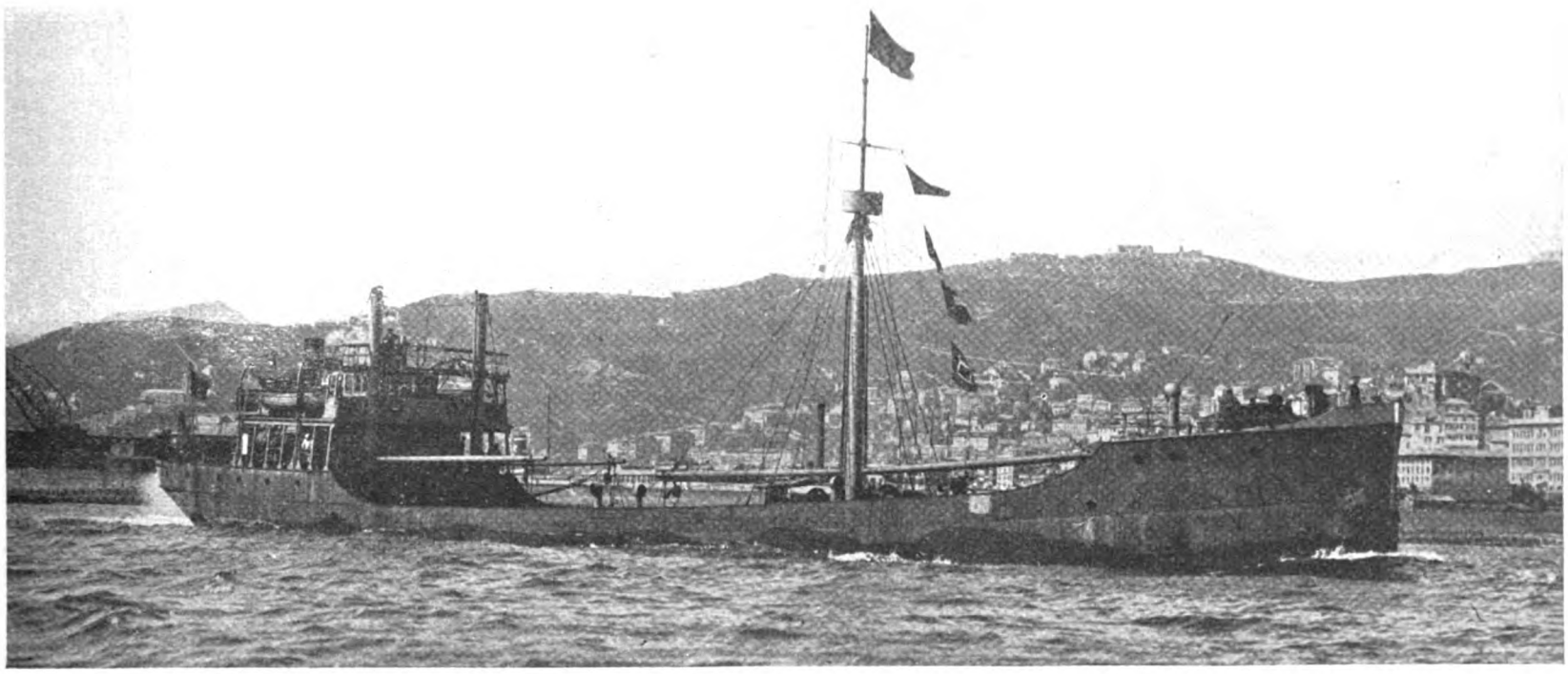


Fig. 8. The space which separates the cylinders from the crankcase, showing the steel tray which prevents carbon deposit or water from falling into the crankpit. The cylinder extensions shown are detachable, enabling the pistons to be inspected or removed,—a feature adopted with all Werkspoor engines.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



The new twin-screw motorship "Isonzo," fitted with two Ansaldo-Savola Sulzer type Diesel engines.

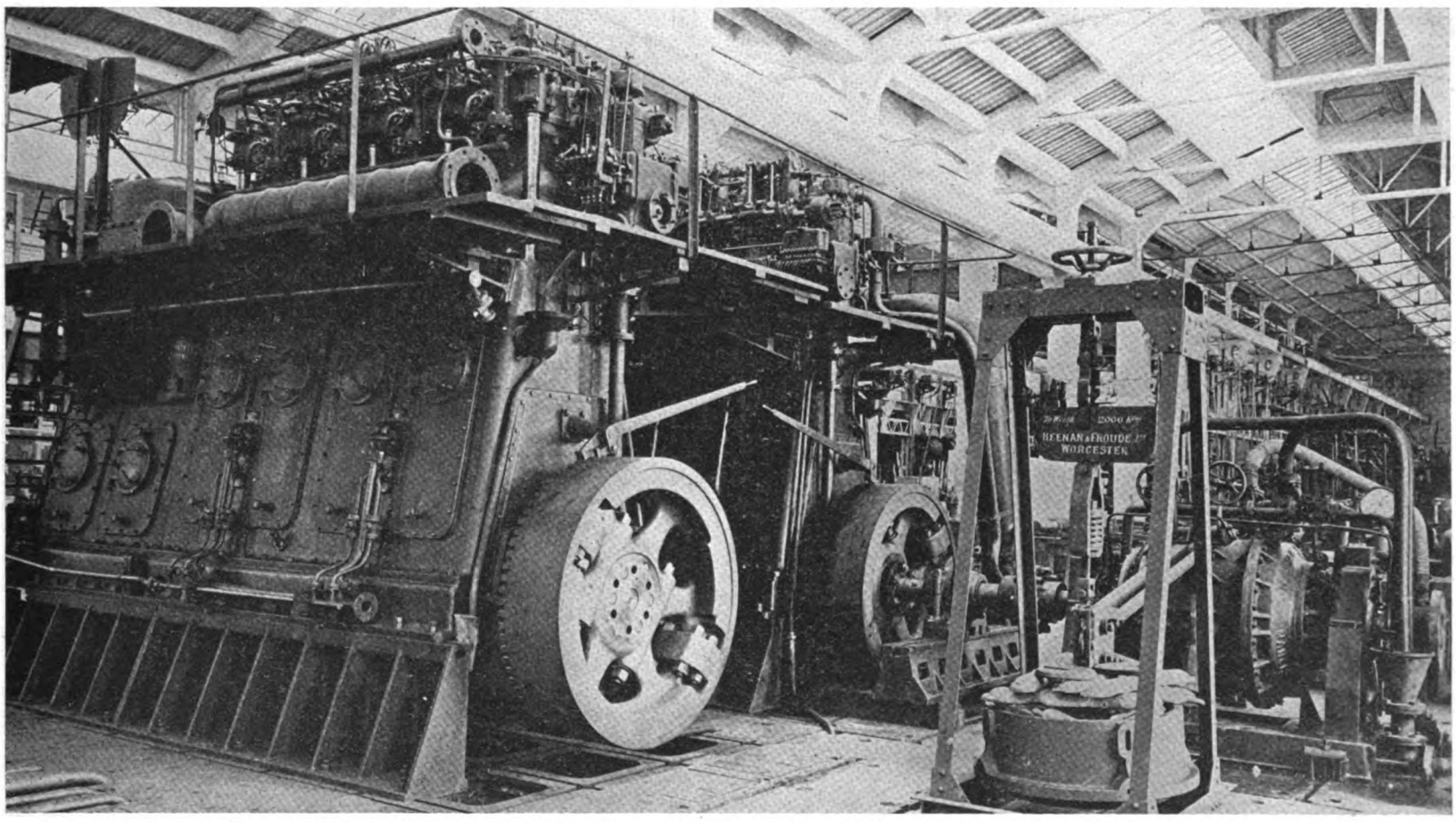
Another Italian Motor Freighter

The "Isonzo," a New Two-Cycle Diesel-Engined Vessel, Built for the Societa Nazionale di Navigazione at the Savoia Yard for the Mediterranean Trade

Although the British railroad strike, and delays caused by unnecessary red-tape restrictions in connection with the passport and police visaes in all European countries, prevented our including Italy in the countries visited, we are enabled to present to our readers some important information concerning standardized steel motorship construction in that section of Europe, but owing to the quantity of material on hand we are obliged to make the same the subject of another article in a later issue, also because of great pressure on space at this time.

However, we now are enabled to give some interesting illustrations of a small steel freighter recently completed for the Mediterranean trade. This vessel is owned by the Societa Nazionale di Navigazione of Genoa, who are strong supporters and advocates of ocean-going motorships. They have a fleet of 8,100 tons d.w.c. motorships on order with the Ansaldo-San Giorgio of Spezia, of which a couple already are in service. They will, we understand, be used in their service between Genoa, Philadelphia and the Pacific Coast, having extensive piers at both the first mentioned ports. It is about this motorship fleet and its builders that we shall have much of interest to say in an early issue of "Motorship."

The "Societa" Cantiere & Officine Savoia of Cornigliano Ligure, Italy, is a shipbuilding and engineering company controlled by the well-known firm of Gio Ansaldo & Co. of Genoa, who have a fully paid capital of five hundred million lire,



The two 420 shaft H. P. Sulzer-type Ansaldo-Savoia Diesel engines of the motorship "Isonzo" on the test-bed.

Generated on 2024-09-13 14:16 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

and who own controlling interests in the Societa Nazionale di Navigazione and in the Ansaldo-San Giorgio Ltd. of Spezia and Turin where both motorships and Diesel engines are in extensive construction. So, the combination makes an important factor not only in the marine oil-engine building industry; but, in the world's entire shipping business, and what they are doing in the way of motorship construction cannot be disregarded by owners of steamships who have to share in the future seven-seas trade competition.

To date the "Isonzo" has given very good service, and her owners are very well satisfied with her performances under Mediterranean trade conditions. She is a single-deck ship with the propelling machinery arranged aft and her general dimensions are as follows:

Length O.A.	225′ 0″
Length B.P.	214′ 0″
Breadth	31′ 8″
Depth	17′ 4″
Mean draught	15′ 1″
Deadweight capacity	1600 tons.
Gross tonnage	1100 tons.
Net tonnage	600 tons.
Shaft horse-power	840 H.P.
Indicated horse-power	1100 H.P.
Speed (fully loaded)	10½ knots.

The engines are two four-cylinder Savoia-Sulzer Diesels of the two-cycle direct-reversible class of 420 b.h.p., and are very similar to the Sulzer engines of similar power, of which nearly 50 were supplied to the French navy during the war, and regarding which we shall have something particularly interesting to say in an article on the commercial and naval motorship industry in France, now in course of preparation for early publication.

There are three cargo holds forward of the engine-room, while 560 barrels of fuel-oil are contained in three separate bunker compartments. For operating the auxiliary machinery of the ship and engine-room, there is a steam-boiler, but when the vessel is at sea the steering-engine as well as the electric-lighting dynamo can be operated by the compressed-air generated by the compressors of the mail-propelling engines.

It seems to us that vessels of this size and power could be used very profitably in such American coastwise services as Long Island Sound, say from Boston, New London, Bridgeport, and New York, etc. They would be very economical, as the fuel-consumption would not be over 28 barrels per 24-hour day. In fact, the power could be doubled and the boat's speed increased to about 12½ knots and still keep her daily consumption to within 60 barrels of oil-fuel.

OUR READERS OPINIONS

[*Publication of Letters Does Not Necessarily Imply Editorial Endorsement of Opinions Expressed.*—EDITOR.]

The View of Representative Alexander

September 23, 1919.

To the Editor of "Motorship."
Sir:

For years past I have taken a deep interest in the motorship subject and have on many occasions called it to the attention of the members of the Shipping Board and have emphasized the possibilities of Diesel engines for the propulsion of modern ships.

Very truly yours,
J W. ALEXANDER.

U. S. House of Representatives.
Comm. on Merchant Marine and Fisheries,
Washington, D. C.

We Aim to Please and to Be of Use

To the Editor of "Motorship."
Sir:

I should like to embrace this opportunity in congratulating you on the publication of such a useful paper as the "Motorship," for useful no doubt it is particularly to Diesel engineers and to advertisers in that direction. To my mind and also the mind of other well-known engineers it is far ahead of any publication of the kind in this country. You may rest assured that I shall recommend it wherever an opportunity may arise.

Yours very truly,
G. F. ASTON,

The Knoll, Croslands Park, Barrow-in-Furness, Lancashire, England.

Question of Engine-Room Crews of Motorship

To the Editor of "Motorship."
Sir:

At the present time, on the mind of all men interested in our merchant marine is the question of the advisability of oil-engines or steam-engines. Today almost all shipowners have recognized the economic advantages of the Diesel engine, but a complaint very often heard is that of the lack of a trained crew for these ships. It must be admitted there are difficulties in this respect, but the reasons for this condition have, to my knowledge, never been ventilated.

I suggest for this purpose to cast a glance on the salary scale of the marine engineers. They are paid according to the tonnage of their vessels, that is, in five classes, of which the lowest is for a 5,000 ton boat for single screw and 3,500 ton for a twin-screw ship. It is natural that every engineer with reasonably long experience at sea, tries to get a ship as large as possible, since it provides the largest income for him and his family. Our American motorships are so far all of relatively small size and, naturally, they carry the least experienced and youngest men. The chief-engineer is young and even if *he* is a very ambitious and intelligent man, his assistants (to whom the same wage rating applies) have so little sea practice that they are sea-sick most of the time and all the burden comes on the chief, then, no matter how willing he is, he cannot stand the duties all by himself. These are very obvious and natural reasons why a good engineer does not stay on an American oil-engined boat.

The question is how to overcome this drawback. The only suggestion I can make is that the shipowners who have realized the economic superiority of the motorship to invest during this time of development a very *small* part of the larger returns in bonuses for the oil-engine engineers. Then, I am sure, the older and experienced class of engineers will try to get on these boats, naturally, because it lies in the engineering profession to advance with the times and to deal with problems which are new to him. Go on board a ship and talk to an engineer about his plant and you will find how he is striving for little novelties on his plant, which he carries out now and then, whenever his little means onboard of a ship allow him to do so.

The proof of my statement is borne out by the foreign vessels which touch our ports with clock-like regularity. All engineers on these boats are former steam-engineers and they like their new job and their engines, and the success of these boats prove it that they do so. But most of these men are experienced steam engineers, so let the operators bring this little financial support to the cause and we will not need school ships, etc. We will soon see the result!

Yours very truly,
H. SCHRECK,

Consulting-Engineer, 17 Battery Place, New York City.

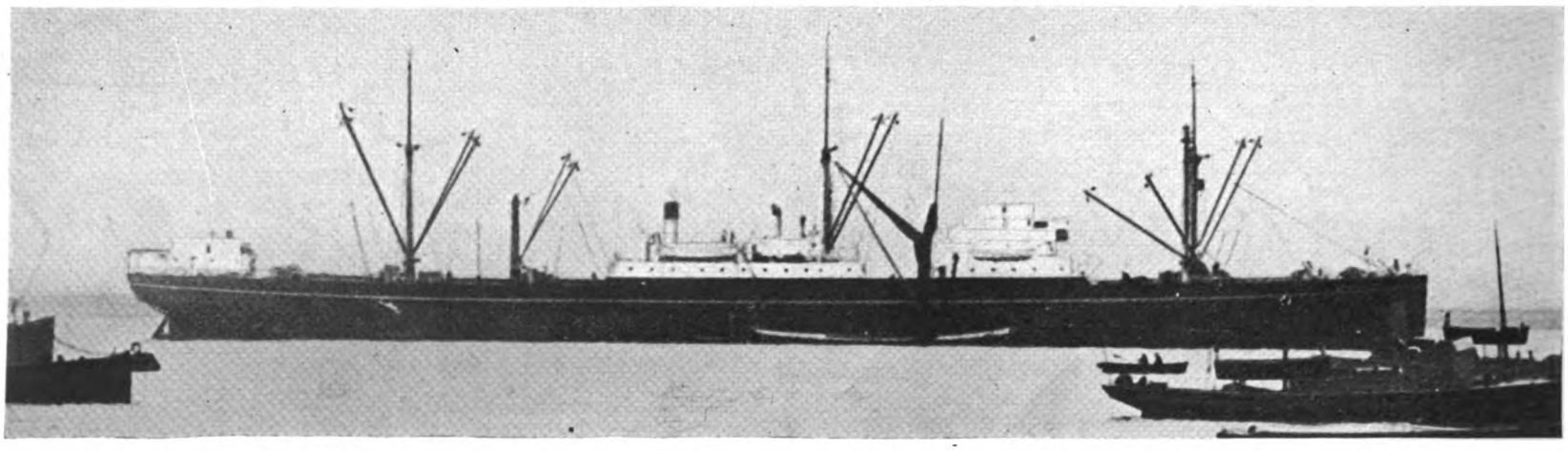
Our Navigation Laws and Motorship Operation

To the Editor of "Motorship."
Sir:

What is the status of the motorship as a class under the navigation laws? After reading through pages of laws and regulations, governing the matter, it appears to the writer that as a class it is only an "addenda." Section 4426 of the Revised Statues states amonk other things:

> "All vessels of fifteen gross tons or over carrying freight or passengers for hire, but not engaged in fishing as a regular business, propelled by gas, fluid, naptha or electric motors shall be and are hereby made subject to all the provisions of Section 4426 of the laws relating to the inspection of hulls and boilers and requirements as to engineers, pilots, etc., etc."

To be sure, as a type the motorship is comparatively new, reckoned against the older types of sail and steam; but in view of its rapid growth, is it not entitled to recognition to a greater extent than so far accorded, before the law. As a type, the rules and regulations which are to govern it should be so shaped and formulated as to not hamper its development or handicap those who have the foresight to invest their money in it. Today it is, so to speak, an orphan. The Department of Commerce have made some rules which recognize its existence but show no proper appreciation of its possible importance or the need of



Another of Lord Pirrie's motorships, the "Glengyle" of the Glen Line. She was built by Harland & Wolff during the second year of the war for the Leyland Line under the name of "Bostonian" and was transferred to her present owners. Her d.w.c. is 10,000 tons and she is propelled by two 1600 i.h.p. Diesel oil-engines. Great Britain and Italy built motorships during the war, but America did not

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

its being handled as a proposition separate and distinct from sail or steam.

Paragraph 35 of Rule V. of the Rules and Regulation of the Board of Supervising Inspectors covers the licensing of engineers of motor vessels, in general, providing qualifications and evaminations, and this rule together with the section of law referred to above seem to constitute the sum total of the law. How much there is that should be covered and provided for is a matter of disdiscussion and it is with a view to promoting discussion that this letter is written.

The New York papers recently noted the appointment of a committee by the Emergency Fleet Corporation to consider the revision of laws as covering tonnage, classification, etc., According to the paper the committee invites criticism and suggestion.

So far in its history the Emergency Fleet Corporation has devoted the greater part of its attention to steam vessels and most of the committee are steamship representatives, without anyone to say a kind word for the motorship as a type. Is not this the opportunity for you to bring before the committee the needs of this particular class so that it may receive consideration at a time when it is just beginning to get recognition and when it may be made or ruined by legal enactment?

Very truly yours,
MORRIS M. WHITAKER,
Nyack-on-Hudson. Naval Architect.

OUR SCHNEIDER SUPPLEMENT

To the Editor of "Motorship."
Sir:

Allow me to extend congratulations on your editorial enterprise in putting out such a fine example of forceful reading on behalf of the great Diesel principle as shown in your June number of "Motorship."

Most especially also do I desire to extend heartiest appreciation of the successful method of bringing before your readers that splendid supplement on the Schneider Co. of France. It is more than advertising—it is literature of the highest type, and the copies of the same are being perused here by artillery and engineer officers with the deepest professional interest.

Yours very truly,
FRANK VAN VLECK, Major, Q.M.C.,
Supervising Marine Engineer.

War Department, Transportation Service, Washington, D. C.

[A reprint of 2,000 copies has been ordered by Messrs Schneider.—Editor.]

Our Schneider Supplement

To the Editor of "Motorship."
Sir:

Accept my congratulations on your most remarkable edition of 'Motorship' and Schneider Supplement. I am somewhat familiar with the publishing game and I wish to say that "Motorship" is superior in finish and tone. Certainly the color plates alone were works of art.

Very truly yours,
P. A. HULL.

Care Harrington, Bingham & Englar, Counsellors-at-Law, 64 Wall Street, New York City.

MORE WAR SECRETS TO BE REVEALED

In the December issue of "Motorship" will be published a profusely illustrated article on the successful Diesel-driven motor warship of a great European power. This is another of the interesting exclusive stories secured by our Editor when in Europe. Do not fail to order your copy early, or you may be disappointed.

Motorships With Tosi-Diesel Power

Several years ago the firm of Franco Tosi of Legnano, Italy, who were well-known in that country as builders of stationary Diesel-engines and marine steam machinery, turned their attention to marine Diesel engines, commencing with naval motors and following with merchant marine propelling and auxiliary power-plants. How they built some 1,300 b.h.p. two-cycle type and 1,300 b.h.p. four-cycle type submarine engines and ran competitive trials in their own shops will be remembered by all readers of "Motorship" for March, 1918. In fact, the exclusive article which gave the results of these tests was reproduced in marine engineering publications all over the world.

The Tosi merchant-type, four-cycle marine engine should be of particular interest to American shipowners as it is being built under license by the Manitowoc Shipbuilding Co., Manitowoc, Wic., and by the United Engineering Works of Oakland, Cal., is a good example of sound marine engineering design, ranking with the best of its type. Altogether Messrs. Franco Tosi have built or are building—according to a list before us which we believe is incomplete—49 marine Diesel engines of the four and two-cycle types for tankers, submarines, sailing-vessels, and full-powered ships, the power aggregating 23,700 shaft h.p. Those in addition to engines constructed at the works of the Offine Insubri of Milan (ex-Langham & Wolff). which plant they purchased during the war, the Italian authorities having taken it from the German owners.

The following is a list of Italian merchant motorships built or now building in which Tosi-Diesel engines form the propelling medium:

At the shipyard of the Cantiere del Consorzio Navale of Pozzano three wooden and one concrete ships are under construction, and it is reported that a six-cylinder 1,000 b.h.p. Tosi-Diesel engine is to be installed in each. The four ships aggregate 7,000 tons displacement, so the power quoted seems hardly correct.

Name of Ship.	D.W. Tonnage	Shaft H.P.	Name of Owner.
Valderi	3,000	2,200	Cantiero Nav. Franco Tosi Taranto of Legnano.
Mascotte	3,200	700	Soc. Ital. di Navigaz Mercon Stella d'Italia of Genoa.
Zilia	3.200	740	Name unknown.
Guiseppi d'Alia	1,000	740	Ditta Zonca Castelli & Carpi of Genoa.
Eugenio Maggo*	500	500	Ditta Zonca Castelli & Carpi of Genoa.
Grabrole d'Alia*	500	1,000	Ditta Zonca Castelli & Carpi of Genoa.
Giacomo d'Alia	500	700	Ditta Zonca Castelli & Carpi of Genoa.
Armorti Oneglia*	500	500	Armatori di Oneglia Soc. An. di Construzione e Navigazione of Oneglia.
Arco Felica II.	450	300	Cantiere Navali ed Officiene. Mechaniche "Arco Felice" of Naples.
Arco Felica III.*	450	350	Mechaniche "Arco Felice" of Naples.
Arco Felice VI.	...	700	Mechaniche "Arco Felice" of Naples.
Olona	...	1.200	N. Odero fu Aless & Co. of Sestri Ponete.
Name unknown (triple screw)	...	480	Societa It. di Navigazione Mercantile Stelle d'Italia of Genoa.
Concrete vessel	...	320	Soc. An. Navi Italene Cemento Armanto of Genoa.
Name unknown*	...	250	Cantiere Navale di Finalmarine of Genoa.
"Anna & Estrelle"	...	680	Fratelli Dufour of Genoa.
Name unknown	...	1,000	Ditta Edoardo Mazza of Savona.
Name unknown*	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Consorzio Cooperative per Custrazioni Navili of Castellamare di Stabia.
Name unknown	...	500	Demetrio Vanni of Genoa.
Tanker*	...	500	Ministry of Marine.
Tanker*	...	500	Ministry of Marine.
Tanker*	...	500	Ministry of Marine.

*Single-screw vessels—others have twin-screws.

ANOTHER ADMIRAL'S OPINION

Admiral Sir Edmond Slade, K. C. I. E., K. C. V. O., says the absolute importance of economy in consumption will necessarily lead to a great extension of the use of internal-combustion oil-engine in maritime practice.

DIESEL ENGINE BUILDERS OPEN NEW YORK OFFICE

An Eastern representative has been appointed by the Busch-Sulzer Bros. Diesel Engine Co., of St. Louis, Mo. Mr. Geo. D. Pogue is the company's new representative and is established at No. 60 Broadway. Mr. Pogue is in a position to handle all inquiries concerning the Busch-Sulzer marine and stationary engines.

MOTOR SCHOONER FOR GREECE

A 550 tons d.w.c. motor-auxiliary schooner has been launched at the D. Boot shipyard at Alphenaan Rijn, Holland, to the order of Perrge Cocotas, Brinden, Greece.

SILENT CYCLE ENGINES?"

In a very complete paper on "Electrification of Ships," recently read before the British Institute of Marine Engineers, Capt. Wm. P. Durtnall refers to the "Paragon silent-cycle' for internal-combustion engines, which he brought out in 1912 in conjunction with Commander Geoffrey T. Bowles, R. N.

AMERICA'S MERCHANT MARINE—SENATOR JONES' BILL—18,000,000 TONS BY DEC., 1920

In two alternative bills introduced into the U. S. Senate on October 3d, Senator Wesley L. Jones proposed to divorce the Shipping Board from building, selling and operating merchant ships, and create a corporation separate and independent of it to maintain, operate and dispose of our ships in such a way as to give an adequate merchant marine on a permanent basis, and that if private interests do not take over the big Hog Island shipyard, it is to be retained for Government construction of large ships for which there are no other facilities. The proposed merchant marine corporation is to operate Government ships for not more than 30 years. It is proposed to complete the Government's shipbuilding programme by December 31st, 1920, so that the United States will have a total of about 18,000,000 tons, including coastwise craft. The bills were referred to the Senate Commerce Committee, of which Senator Jones is chairman. He is a strong supporter of motorship and Diesel-engine construction, as are several other members of the Committee.

Owners of Motorship "Bullaren" Contract for Six Additional Diesel-Engined Ships of 9,400 Tons D.W., and Will Convert Existing Steam Fleet to Motor Power.

So pleased are the owners of the "Bullaren" and her sister ship, the "Tisnaren," they are most seriously considering converting their 36 existing steamships (varying from 2,200 tons to 8,800 tons d.w.) to Diesel motor power. In fact, they already have decided to convert their best steamship, the S. S. "Bolmen," at a cost exceeding the original investment.

Work on the plans are practically completed, and the same together with full details will be published in an early issue of "Motorship," through the courtesy of the Rederiaktiebolaget Transatlantic of Göteborg, Sweden, who also have contracted for five additional 12½-knot motorships of 9,400 tons and one of 7,500 tons d.w., all to be completed within 1924 at the Götaverken shipyard, Göteborg. The first of these—a tanker—was ready for launching at the time of penning these notes. The other five will be cargo-passenger vessels. We publish the above information with reservation, although it was given us by a representative of the company.

FUEL STATIONS FOR MOTORSHIPS

American and British interests are said to have organized the $10,000,000 British-Mexican Petroleum Co., which will bunker motorships and steam vessels at various ports throughout the world.

McCORD DOES RECORD BUSINESS

We have been advised by the McCord Manufacturing Company, of Detroit and Wyandotte, that record business was done during the month of September, exceeding the best previous figure by over 28 per cent. This particularly refers to the gasket division. It looks as if the factory will be working at full speed throughout the winter and the management is fortunate to have sufficient raw material on hand and in transit to take care of demands for many months to come. We also have been advised that Mr. Malcolm McCormick, who for many years was associated with the Burroughs Adding Machine Company and the Chalmers Motor Corporation, has been appointed in charge of sales and advertising.

Generated on 2024-09-13 14:25 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Diesel Electric Drive For Wooden Freighters

Many Idle Vessels Could Be Made to Pay, Provided Their Hulls are of Sound Construction

One of the qestions still being asked today is what shall be done with the wooden ships that have not been placed in service. The majority of opinion is to accept them as a war loss and break up the hulls for firewood. On the other hand, there are those who think that at least some serious attempt should be made to utilize them, also to render operatively economical such craft of this type that already are in service, which at the present time burn approximately 50 tons of coal per day and require a crew of about 45 men, apart from heavy depreciation charges on their high first cost.

A conservative estimate of the cargo-carrying capacity of the wooden-built steam-propelled (or designed for steam machinery) vessels lying unused—and in most cases undesired—in the various parts of the United States, would place it at about half-a-million tons. There are several reasons why these boats have been shelved, even before the engines were installed, and this subject we need not discuss here, and we can put to one side the hulls that have developed serious structural weaknesses. But it is essential to bear in mind that a wooden vessel must be able to show a substantial preponderance of earning capacity over running expenses, otherwise she cannot possibly hold her own under normal ocean trade conditions against steel ships. Earning capacity primarily means actual cargo-carrying capacity, and not deadweight capacity, because the latter includes bunkers.

This particularly applies to these full-powered wooden craft owing to their heavy fuel-consumption, on a long voyage they having to carry nearly as much coal, boiler-water and stores as cargo. Neglecting specific freight rates and definite trade routes, a vessel's operating expenses as opposed to net carrying-capacity therefore determines its efficiency in service.

To complete the unfinished hull, and to convert existing uneconomical wooden steamships—constructed in an emergency and built in the same manner—to rational and economical cargo-carriers is the object sought by men who consider something should be attempted with the nation's wasted millions. It is obvious that steam machinery of any type in these wooden hulls cannot form a solution of the problem. It has been proposed—and in a few isolated cases it is being done—to instal large slow-speed Diesel engines, but this has met with much opposition on the ground that it would be a pity to spoil such comparatively expensive machinery, which would quickly suffer by reason of having to stand all the strains of the hull in a seaway.

A proposal has been brought forward to turn the engine-room of some of the more seaworthy hulls into miniature electric power-stations and use the current generated to propel the ship. In this way several comparatively small and lightweight Diesel oil-engines and generators could be utilized. By reason of their small size and independency they would not be subject to as severe strains as would large heavy-duty engines direct coupled to the propeller shafts. In this way very economical propulsive power could be obtained together with flexibility and simplicity of operation, and the loss of power between the Diesel engine and the electric transmission would not be over 10% at the outside, which loss would be quite insufficient to seriously effect the great economy afforded by the use of the internal-combustion oil engines. Furthermore, we suggest that if possible, the entire engine-room floor be covered with a thick layer of concrete.

Today there is little that is experimental about electric drive, for even with our highest-powered battleships it has been found very satisfactory, while dozens of towns are dependent upon Diesel-electric generating plants for their electric light, also the diffusion of practical operating knowledge in regard to Diesel-electric machinery is beyond question almost as complete as any system of power in use today. In fact if the prevailing type of power on the high seas today was electricity, there would be no shortage of efficient operators to draw upon to man the engine-rooms of the merchant fleets of the world.

A plan to equip these wooden vessels with Diesel-electric power has been put forward by the Winton Engine Company, of Cleveland, which it is claimed calls for a minimum of structural changes and financial outlay, and it is possible that the scheme that we are about to describe to illustrate, without committing ourselves to any definite expression of opinion, has points which may commend the proposal to companies desirous, or considering, purchasing and operating hulls.

In addition to the excellent economy that could be obtained, there will be an actual gain of over 500 tons of cargo-carrying capacity compared with the present coal-burning ship. All the machinery will have Diesel-electric drive, both for main and auxiliary power. The latter will be generated by either, or both, of two Winton oil engines and 50 K. W. General Electric generators. It is contemplated to have only oil fuel on board to be carried in tanks, and thus even the heating and cooking will be by electricity.

Most prominent of the structural changes involved in the proposed installations is the conversion of all coal-bunker space and about half of the boiler-room into cargo holds. This space is directly amidships and is the extreme width of the vessel's beam. It also is directly under the cargo booms, necessitating no man-handling to unload and little to stow the cargo. Additional living quarters, or a store-room, is obtained by closing in the space in way of the present smokestack and the fidley hatch over the boilers.

In addition there is the space in Hold No. 2 occupied by the shaft alley, about 2,000 cu. ft. A little of this saving will be counteracted by the installation of the main motors forward of the afterpeak bulkhead, and dead wood. Ventilation to the engine-room could be provided from the poop deck.

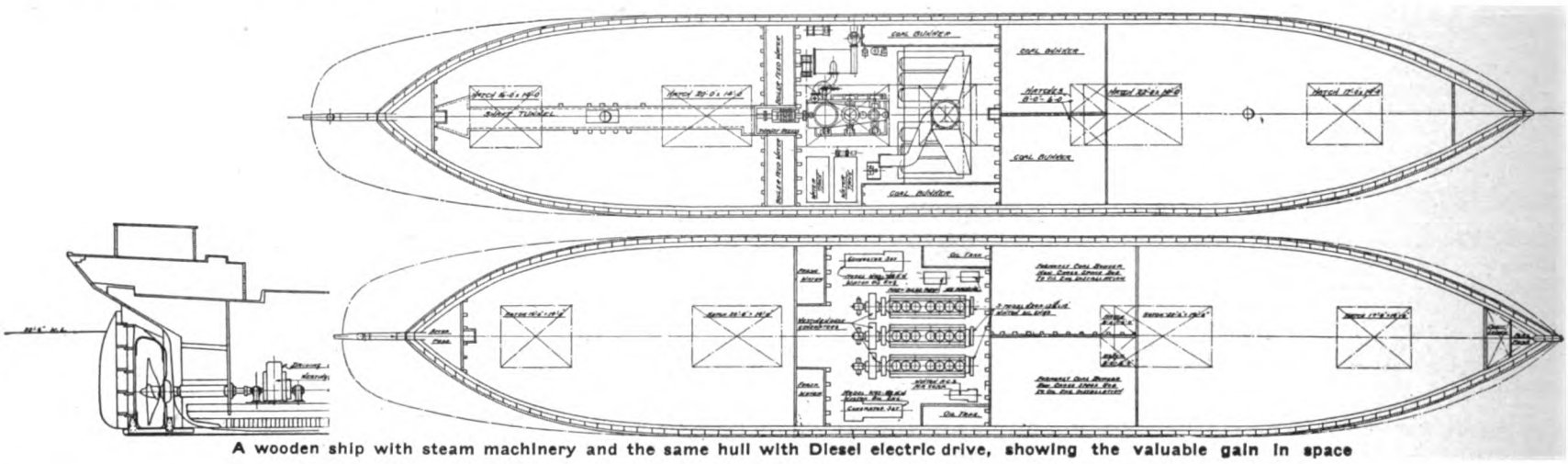
In our opinion at least 2,000 b.h.p. in 500 h.p. units should be installed, as at present the vessels have not sufficient speed; but, with the proposal submitted to us, for the propulsion power, is suggested an installation of three Winton Diesel oil-engines of either the 6 or 8-cylinder models, which would give a total of 1,150 b.h.p. or 1,400 b.h.p with a minimum chance for a complete loss of power due to a breakdown of all three generating units. Each engine of the eight-cylinder 500 b.h.p. type would consume approximately 25 gals. of fuel-oil per hour. Therefore, a sea-voyage to South America, Europe, and return to New York—a favorite and long-established triangular route—would necessitate a bunker capacity of 100,000 gals. (about 355 tons) or sufficient for 110 days of full power operation tanks for the stowage of this amount could easily be provided.

As the engine-revolution speed will be higher than heavy-duty direct-coupled Diesel engines, the fuel-consumption will be about 0.45 lb. per b.h.p. hour, and allowing a maximum loss of 10% in transmission, the consumption per shaft h.p. will be approximately 0.55 lb. per hour, compared with about 1.75 lb. of coal with existing wooden ships.

The revolutions of the single propeller may be kept to anything that is desired, as low as 90 r.p.m. if the screw used is large enough to give the required thrust at that speed. Provision will naturally be made to operate all three of the generators together or separately on the main motor circuit, and whether or not the current generated is direct or alternating, the control would preferably be in parallel.

Either of the main motors may be used to supply current to the auxiliary machinery circuit, and it is easy to see how flexible and certain the supply of power for any and all purposes may become. For instance, if the two 50 k.w. auxiliary generators deliver current at 250 volts, the main power circuit could also be designed for that voltage. If during loading or discharging cargo the 100 K. W. output of the two auxiliary units is not enough any one of the main generators can be used, given practically an unlimited source of power for use in port.

To the mind of the average purchaser the engineering phase of the question probably will be accepted without question—the popular faith and reliance placed in any electric machinery being almost universal. The cost of such an installation is a horse of a different color and we trust that there will be no difficulties along that line to prevent the turning to good account the immense amount of sea-worthy tonnage now available but lying idle in our various ports. Credit is due to the Winton Company for furnishing the arrangement plans shown in the accompanying sketches, and if no practical difficulties arise that are at present unforeseen, the scheme is not likely to be insurmountable. At least it is worthy of a proper tryout, and the same will give a certain amount of valuable experience, as it may not be long before some ocean-going passenger liners of 20,000 to 30,000 h.p. will be Diesel-electric propelled.



A wooden ship with steam machinery and the same hull with Diesel electric drive, showing the valuable gain in space

U. S. NAVY DEPARTMENT PLEASE DO NOT COPY THIS EXAMPLE

Over four years ago the British Admiralty purchased a twin-screw set of European Diesel engines aggregating 3,000 shaft horse-power. After successful shop trials these engines were shipped to Chatham, where they have been lying in their cases for three or four years, and during a period when propelling machinery was in great demand. It is outside the jurisdiction of an American publication to pass any comments on what the British Admiralty does. But we can suggest that some American shipowners may be able to purchase these engines for a cargo-vessel. They are of one of the best makes, and no doubt the builders would be glad to incorporate their latest developments in these engines.

CONVERSION OF AN OLD WHALER

A 300 h.p. McIntosh & Seymour Diesel engine is to be installed in the old whaler "Thresher," owned by Hibbard, Stewart & Co., of Seattle.

Generated on 2024-09-13 14:07 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Interesting Notes and News

THE TOSI-DIESEL ENGINE ON THE PACIFIC COAST

The Tosi-Diesel engine is being built under license by the United, Engineering Company of San Francisco, Cal.

MOTOR AUXILIARY FOR THE AZORES

Now building at Waspik, Holland, is a motor schooner of 420 tons d.w.t. named "Uniac Accreana" to the order of the Empresa Michaelense de Transportes Maritimos de Ponta, Delgada, Azores. A two-cylinder 130 b.h.p. Bolnes heavy-oil engine is being installed.

SIXTEEN-KNOT CARGO MOTORSHIPS

How many shipowners realize that a 9,000 tons d.w.c. Diesel motorship of 16 knots average speed uses less fuel and carries more net cargo than a 11-knot oil-fired steamer of the same size. See our editorial leader on page 27 of this issue. It is headed, "Ship-Speed and Economical Operation."

NEW AMERICAN MARINE DIESEL ENGINE

Now in course of erection at the Seattle Machine Works, Seattle, Washington, is a single-cylinder 10"x12" Diesel type marine engine which has been built for experimental purposes, it being the intention of this company to develop a Diesel type engine for marine purposes. With the exception of a 4-cylinder 250 b.h.p. surface-ignition oil-engine of their own design, all the work of this firm has been connected with steam engines and equipment. For the past two years they have been turning one 3,000 h.p. marine steam-engine set per month.

INCREASED PROGRESS BRINGS COMPETITION AND COMPETITION PRODUCES ADDITIONAL BUSINESS

With the passing of each week it seems we learn rumors of more and more reputable and successful engineering firms becoming actively engaged in producing Diesel engines for marine purposes. It has been reported that Allis-Chalmers Co. of Milwaukee, Wis., has developed a marine type oil-engine in their Diesel engine department.

NEW HIGH-POWERED GASOLINE-ENGINED TUG

Work on the construction of a 92-ft. motor tug has been commenced at the yard of Frank Stone, East Oakland, Cal., for Young Bros. of Honolulu. This craft will be installed with a six-cylinder 13"x13" four-cycle type double-acting Standard (Eastern) gasoline engines without flywheel. Two compressed-air driven capstans made by the Hyde Windlass Co. will be fitted.

AUXILIARY POWER BADLY NEEDED

Owing to absence of wind for extensive periods the three-mastered schooner "Carolyn Francis" recently arrived at San Francisco, having taken 123 days to sail from Suva. She was built last year, and although arrangments were made for auxiliary power, no engines were installed. However, we understand that the owners, the Northern Pacific Fisheries Co., will have motors fitted. But, we hope they will not make the mistake of underpowering her, as the same will prove to be false economy.

WHAT "SYREN & SHIPPING" OF LONDON THINKS

From a recent issue of "Syren & Shipping" of London, we cull the following interesting paragraph:

"We have always understood that since the Armistice, Mr. Hurley was a convinced advocate of the motorship, and we have every reason to believe that the same impression ruled in the States. We are not, therefore, surprised at the protests, led by Mr. Charles Piez, against the Shipping Board cancellation of the thirty sets of Diesel engines which were on order for eventual installation in the Emergency Fleet hulls. Of course, Mr. Hurley refused to revise or rescind the cancellation, and the builders have appealed to Caesar. The Motorship, in an editorial note, agrees with the protest, which candidly we think is justified." . . . "We are rather strongly convinced that American shipping in certain trades—not in all—will largely depend on motor engines, and neither Mr. Hurley nor the Shipping Board can prevent what is the logical outcome of the geographical distribution of the world's natural resources. American shipbuilders will not be forever in leading strings, and as soon as the happy release comes they will start building motorships on their own account."

AMERICAN CONCRETE MOTOR TANK BARGES

In each of the two concrete tank barges of 1,900 tons d.w.c. building for the France & Canada Oil Transportation Co. of New York, a pair of 160 b.h.p. Bolinder heavy-oil engines has been installed.

DIESEL MOTOR TRAWLERS

A steel motor trawler 140 feet long, 25 feet beam and 13 feet draught is building at the yard of Rice Bros., East Boothbay, Me., for John Chisholm & Son of Gloucester, Mass. She will be powered with a 360 h.p. Nelseco Diesel engine and will have a speed of 10 miles per hour.

MR. ROSSETER AND MOTORSHIPS

Just before Mr. J. H. Rosseter resigned his position as Director of Operations of the U. S. Shipping Board he signed a recommendation for the construction of 25 steel motorships, each having a deadweight capacity of 11,000 tons and a loaded speed of 12½ knots. He said that he is firmly convinced that the internal-combustion oil-engins is the economical power and that he is very much in favor of motorships. "But, Mr. Rosseter, why didn't you sign the recommendation six to twelve months before and see that the boats were built? However, now that you are back again with the Pacific Mail Steamship Company, it is up to you to see that all their steamers are converted to Diesel power."

AUXILIARY MOTORSHIPS IN CANADA

Six wooden auxiliary motor-vessels are building by the Leclaire Shipbuilding Co., at Sorel, Quebec, Canada. They will each have a twin 120 h.p. Skandia surface-ignition engine, and will be ready for service in the spring of 1920.

Two wooden auxiliary motorships are being built at Hartsport, Nova Scotia, Canada, by Fauquier and Porter. They both will be of 2,000-ton deadweight capacity, 180 feet long, 40 feet breadth and 18 feet draught. The engines will be two 100 h.p. Fairbanks-Morse surface-ignition type in each boat.

Another auxiliary is building by Harrison and Lemond, South Vancouver, Canada, for the Canadian Imperial Munitions Board of Ottawa. This vessel will be 225 feet long, 44 feet breadth, 21 feet 4 inches draught and of 2,550 tons d.w.c.

MR. J. H. HOUSTON'S STRANGE CONCEPTION OF MOTORSHIPS AND THEIR OPERATION

In a paper entitled "*The History of the Steamship*," read by Mr. John Houston before the Institute of Marine Engineers at the recent London Shipping Exhibition, the following strange conception of motorships and their operation were given:

MOTOR SHIPS

"We have for so many years been accustomed to the use of the word steamship when talking about ocean-going vessels, that it is with difficulty we bring ourselves to speak about "motor ships," but to be correct we must do so, when we come to discuss vessels fitted with some form of internal-combustion engine.

"The Diesel engine first appeared towards the close of the last century, and, as was the case with the turbine, it was employed for many years on land work before being applied to marine purposes. But technical knowledge and science are always progressing, and in due course a marine engine was designed, which, in the lower powers at any rate, gave fairly satisfactory results. The motorship 'Vulcanus' was amongst the first to be built, and engined with those engines. *Generally speaking, the number of motorships has not yet reached very great proportions in the mercantile marine*, chiefly because the ordinary cargo steamer has to seek employment all over the globe, and *the supplies of the necessary oil are not available.* Those companies whose vessels are in the oil carrying trade can with advantage to themselves instal the Diesel engine in their vessels, as the consumption of oil in that type of engine compares very favorably with the consumption either of oil or coal in steam propelled vessels."

It is obvious from Mr. Houston's remarks that he is quite unfamiliar with the subject, or to put it in plain slang, "he is talking through his hat." Does not Mr. Houston know that 800 tons of fuel-oil in the double-bottom of 12½-knot tramp motorship will carry her at least 25,000 nautical miles, which enables her to bunker about three times a year wherever oil is cheap. It would have been better for Mr. Houston's reputation had he

MORE CONCRETE MOTORSHIPS

Another 1,000 tons d.w.c concrete motorship has been launched from the Fougner shipyard, at Moss, Norway. This vessel has been named "Concrete" and is powered with twin 160 b.h.p. Bolinder oil engines. The total capacity of her holds is 50,800 cubic feet. This does not include the bunker. The new 700 tons d.w.c. concrete motorship "Linnen" also ran her trials recently. She was built at Malmo for the A. G. Betongett of the same city. Two oil-engines form her propelling power.

SIX THOUSAND B.H.P. SUBMARINES

Now at the Philadelphia Navy Yard are two 3,000 shaft h.p. Augsburg submarine Diesel engines. These are the same as those installed in the U-142, which submersible craft has the following dimensions:

Length	320′ 0″
Breadth	31′ 6″
Depth	17′ 6″
Displacement (submerged)	2,785 tons
Displacement (surface)	2,158 tons
Power (surface)	6,500 b.h.p.
Power (submerged	2,600 b.h.p.
Speed (surface)	18 knots
Speed (submerged)	8.1 knots
Bunker capacity	451 tons
Cruising radius (low speed)	20,000 nautical miles
Complement	83 men

In the power quoted there is one 500 b.h.p. Diesel engine, either for slow-speed cruising or for auxiliary purposes.

U. S. SHIPPING BOARD'S FUEL STATIONS TO GIRDLE THE WORLD

American ships can soon make a circuit of the world without the need of taking fuel at other than American-owned fuel stations. This applies to vessels proceeding east from the Atlantic Coast or west from the Pacific seaboard. The United States Shipping Board realized that after war conditions might develop a situation with respect to coal supplies which would dictate the necessity of a modified application of bunker license at British stations. We would have been at a serious disadvantage, says the Board, unless immediate steps were taken to assure unrestricted operation of our ships in the world's trade. To accomplish this it was necessary to have oil-burning ships, instead of coal burners, with large cruising radius, and so far as practicable this to be fixed at a minimum of 10,000 miles. The British order of September 29th, 1919, justified these apprehensions. But at that time we were ready.

At the Panama Canal, the turn at the world's cross road, facilities already existed and only required to be amplified. To take care of the east coast trade of South America, a station was erected at St. Thomas. This station, which had an initial capacity of 15,00 tons of storage, was opened on October 2nd, 1919. Arrangements have been made for establishing a station at the Azores and anand located on the ocean highway to the Indies. other at Bizerta, a small French island off Tunis, Material has been assembled at Manila where another large storage tank is to be erected.

"Despite what has been done," said J. H. Rosseter, the director of the Shipping Board's Division of Operations, "we feel that we are still at the threshold of the major part of the question.

"We must awake to the importance of encouraging the establishment of national interest in other known and probable oil regions of the world. For two years our British friends have been admirably directing their attention to new oil regions, notably those of Colombia, Venezuela and Ecuador, also to the fields of the Levant in which it is surmised that the fields of Turkey promise results exceeding the output of the great oil fields of California, which the Turkish fields are said to resemble."

Today this nation possesses a fleet of 486 oil-burning steel steamships representing 3,798,733 deadweight tons of new construction. In addition there are 49 freighters of the oil-burning type which have been returned by the Shipping Board to their American owners and still another group of 18 which have been sold by the Board and which are under the American flag. Of the 720 steel vessels under construction and contracted for, 636 are oil-burners, these aggregating 4,691,659 deadweight tons. When the steel program has been completed there will be a total of 1,731 ships of the oil-burning and Diesel type under the American flag.

In view of the above it must be obvious to the U. S. Shipping Board that had all these vessels been Diesel powered instead of oil-fired steam, there would have been a saving of at least 20,000,000 barrels of oil during 1919 alone.

Generated on 2024-09-13 14:22 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

A LARGE OUTPUT

Altogether 250 commercial and naval type marine Diesel engines aggregating 150,000 b.h.p. have been constructed and delivered by the Ansaldo-San Giorgio of Turin, Italy.

NEW ANALDO MOTORSHIP YARD

It is said that Ansaldo & Co., of Genoa, are erecting a new shipyard at Catrona (Calabria) for the purpose of building oil-engined auxiliary sailing-ships.

ANSALDO-SAN GEORGIO MOTORSHIPS

By the time this paper appears in print, the third of the Ansaldo-San Georgio standardized motorships will have been launched. The second vessel was launched on July 24th last and made her maiden trip to a South American port.

"CIMBRIA," A 650-TON DIESEL-DRIVEN VESSEL

The Cimbria Co. of Brantvik will shortly take delivery of the new 650 tons Diesel-engined vessel "Cimbria," that has been launched at the yard of J. C. Petersens Mt. Verksted at Tvellebork. This yard has been purchased by the A/B Svenska Maritimverkes of Tvelleborg.

JET PROPULSION

Further experiments in water-jet propulsion of vessels are now being made by the British Admiralty.

GREECE SHIPOWNERS AND MOTOR VESSELS

The Dutch steel motor schooner "Steenwijkerdiep," of Rotterdam, about 400 tons deadweight, built by Messrs. Boot, of Leiden, in June, 1918, classed 100 A4 German Lloyd's, fitted with Rennes engines of 90 h.p., giving 6 to 7 knots, has been sold to Greek buyers for about $52,800.

THE TWO GREAT OIL COMPANIES

It is said that the various Standard Oil Companies together control 281 oil companies and that the Royal Dutch-Shell Combine controls 311 companies. But, we will not vouch for the accuracy of these figures. However, both concerns are enormously wealthy and powerful. Incidentally "Motorship" is doing its little bit to increase their wealth, and the business of other oil firms, by encouraging the wide use of fuel-oil, although we actually are doing it for the benefit of the entire American nation, and in order that we shall establish a successful and permanent merchant marine.

THE NEW NEPTUNE MARINE ENGINE

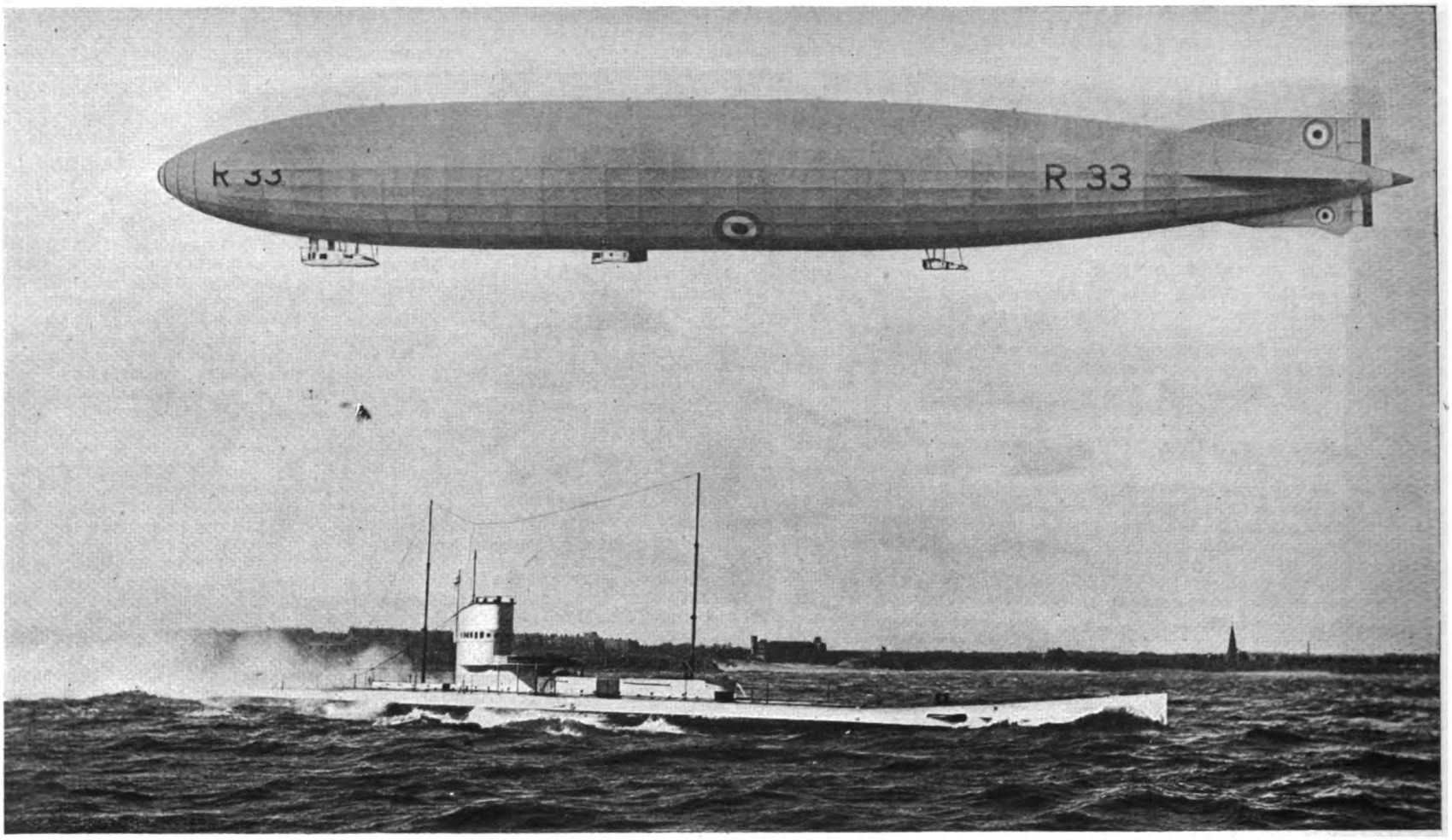
Owing to great pressure on space we are obliged to hold over, among other articles, an interesting description of the new 1,500 i.h.p Neptune Diesel type marine-engine building at Swan, Hunter & Wigham Richardson's works at Walker, Newcastle-on-Tyne, England.

U. S. SHIPPING BOARD'S 12-KNOT MOTORSHIP

It is intended to instal the first pair of 2,250 i.h.p. B. & W. Diesel engines, purchased by the U. S. Shipping Board, in one of the 12,500 tons d.w.c. hulls now building at Pusey & Jones' shipyard, Wilmington, Del.

U. S. SHIPPING BOARD'S DIESEL ENGINE CONTRACTS PARTLY RE-INSTATED

Shortly after the Armistice, the U. S. Shipping Board cancelled most of the Diesel engines on order. Some little time ago this order was partly re-instated. At the present moment there are 18 engines of 900 b.h.p. and 8 of 750 b.h.p. building or completed at the McIntosh & Seymour Works, and two of 925 b.h.p. at the Skandia-Werkspoor plant, for the Board. Therefore, including the B. & W. engines the Board has ordered 30 Diesel engines aggregating 27,950 shaft h.p. or approximately 36,000 i.h.p. without counting cancellations.



The above illustration of a J-class British submarine and the Armstrong-Whitworth-built airship R-34 will be of particular interest as the U. S. Navy Department contemplates purchasing the airship R-38 which has a capacity of 2,724,000 cub. ft. of gas and is 694 ft. long and has a lifting power of 45 tons. Also because Armstrong-Whitworth are designing airships of 3,500,000 cub. ft. capacity for a regular transatlantic service. The submarine depicted is propelled by three 1200 b.h.p. Vickers-type Diesel oil-engines and has a speed of 19 knots

COST OF FUEL-OIL ON THE PACIFIC COAST

According to the committee of the Committee of the Seattle Chamber of Commerce fuel-oil must be cheaper if many steamship lines are to continue in existence. Why not install Diesel engines and burn one-third of the quantity of oil more cargo? No need then to worry about the about the price of fuel-oil.

NINE NEW ITALIAN MOTOR AUXILIARIES

Three 500 b.h.p. Tosi-Diesel engines auxiliary sailing-vessels are under construction at the Cantiere Calabretta at Castellamere di Italia. At the Cantiere Gerolamo Ferro, Verazze, two motor auxiliary sailing-ships of 350 b.h.p. each are under construction. They have been named "Ernesto" and "La Nena." The vessel "Guiseppe d'Ali" is having two 350 Tosi b.h.p. oil-engines installed, while the "Gabriele a'Ali" is having one Tosi motor of 500 b.h.p. The "Anna & Estrella" will have two 340 b.h.p. oil-engines. As readers of "Motorship" are aware, a large number of motor auxiliaries have been built in America for Italian interests during the war.

ITALIAN SHIPBUILDING

Italian shipbuilding companies have pledged themselves to supply 7,00,000 tons of new ships during the next two years and 1,000,000 tons the third year, on condition that the Government promises not to change the maritime laws for at least fifteen years.

QUAGLIA & GALDINI'S MOTORSHIP FLEET

Among Italian shipowners who have turned serious attention to motorship operation is the firm of Quaglia & Galdini of Genoa. Not only has the company motorships on order, but already own the following fleet:

Name of Ship	D.W.C. Tonnage	Shaft Horse Power	Makee of Diesel Engines
Blanche	3,500	400	Insubri
Po.....	1,300	600	Sulzer
Merioneth....	1,200	380	Savoia-Sulzer
Yard No. 2...	1,600	250	Ansaldo-San Giorgio
Yard No. 3...	1,600	250	Ansaldo-San Giorgio
Aosta.....	700	125	Kind

An interesting article on motorship construction was published in the August issue of "La Marine Mercantili," from which the above figures were culled.

NEW SECRETARY TO U. S. SHIPPING BOARD

The U. S. Shipping Board announces that John J. Flaherty, who has been acting secretary of the board, has been appointed secretary of both the Shipping Board and the Emergency Fleet Corporation.

ANOTHER ROYAL DUTCH-SHELL EXTENSION

The ordinary shares of the five leading Scottish shale-oil companies have been acquired by Scottish Oils, Ltd., a new company with a capital of twenty million dollars. It also has acquired the good will, as far as it relates to Scotland of the British Petroleum Company and the Homelight Oil Company. In order to keep these refineries fully employed, the Anglo-Persion Oil Company, which organized the Scottish Oils, Ltd., will supply crude-oil from Mesopotamia. It is hardly necessary to repeat that the Anglo-Persian Oil Company is a twenty-five million dollar concern and that the British Admiralty owns ten millions of the stock, but the Government's two directors can overrule the three elected by the shareholders. The Anglo-Persian Company, of course, is a subsidiary of the Royal Dutch-Shell combine.

Generated on 2024-09-13 14:16 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

DEVELOPMENT OF THE INTERNAL COMBUSTION TURBINE

In a paper read at the recent Shipping Exhibition at Olympia, England, Charles Baxter, M. I. M. E., gave a well-connected historical analysis of the internal-combustion engine. Progress from the first application of gunpowder in a cylinder to the modern multi-cylinder, two and four-cycle engines was dealt with.

Treating each subject in a general but lucid manner he discussed cooling, lubrication, starting, governing, etc. The design of the details, pistons, valves, carburetors, magnetos, and ignition systems were briefly mentioned.

Compression pressures vary in all types of the present day engines. The effect of precompression in either the gasoline of heavy oil engines is clearly understood, and from the figures given by Mr. Baxter a direct relation is seen between the higher compression and combustion pressures and the average efficiencies of the different types.

Losses in the internal-combustion are variously estimated and a fair average may be considered to be:

Loss	Per cent
In exhaust	52.5
In water jacket	15.3
Friction, etc.	4.7
Power at crankshaft	27.5
Total	100.0

Interchangeability and factory production as a result of the use of limit gauges and precision tests is mentioned. The author referred to speed of production and the cutting of costs, and said little can be done in the shops that cannot be more easily and better accomplished in the proper place, i. e., the drafting office.

After the successful results attained in the recent development of the Still combination steam and internal-combustion cycle, we may shortly hear of further progress of some form of internal-combustion turbine. Mr. Baxter submits with his concluding remarks a description and plans of an internal-combustion turbine designed by him, which by reason of the object sought and the difficulties met with provides one of the most interesting and valuable portions of the paper. Undoubtedly the turbine will come, but at present there seems to be nothing in the engineering field of endeavor less promising of practical success.

ITALIAN COASTWISE MOTORSHIPS

Six coastwise motorships of 450 tons d.w.c. are building in Italy, and in each vessel a 400 shaft h.p. Ansaldo-San Giorgio Diesel engine will be installed.

ELECTRICAL APPLIANCES ON THE PACIFIC COAST

We have been advised that a new branch has been opened at 83 Columbia street, Seattle, Wash., by Messrs. Chas. Cory & Sons, Inc., of New York, in order that ships electrical installation and repair mechanical communicating work may be more promptly attended to. A complete stock of marine electrical appliances, etc., will be carried in Seattle.

STANDARDIZING MOTORSHIP BUILDING

Emulating the example and success of several Scandinavian shipyards, the Rodby Harbour Shipyard at Rodby, Denmark, has been laid-out for the construction of vessels fitted with internal-combustion engines exclusively. The first of six standardized auxiliaries of 3,500 tons d.w.c. has been launched. Very low power has been provided as only two four-cycle engines of 160 b. h.p. each are installed in these boats. The vessels are primarily sailing-vessels, and it is to be hoped that the motors will not be called upon to operate continuously.

Two full-powered motorships of 6,000 and 4,000 tons deadweight are under construction at Nakskov. Contracts for six motorships to be powered with B. and W. engines have been let by the Grangesberg Ore Company of Sweden.

Merchant-Marine Diesel Engine Construction in Switzerland

(Continued from page 49)

common crosspiece worked by an eccentric from the vertical governor shaft, and the fuel-oil flows by gravity from a reservoir to the common suction chamber through a double set of filters, whence it is forced to the fuel-injection valves. Two non-return valves arranged in series are provided in each connecting pipe between the fuel-pump and fuel-valves.

Fuel supply to the working cylinders is controlled by varying the lift of the suction valves. These valves can also be adjusted from outside by hand and by means of the same arrangement any cylinder can be cut out during service.

In accordance with the latest motorship practice all engine controls are arranged at the upper platform, where the operator has plenty of air and light, and where he can keep close watch upon the cylinder heads and valves. We have no hesitation in recommending the adoption of this practice as a standard for the world, and already several builders are using it. It will assist in efficiency and encourage a desire among ships' engineers to go to sea on oil-engined vessels. But some marine engine builders consider that near the engine-room floor is the proper place for the controls, as standing on the grating for a lengthy time is very tiring for the engineer on watch. However, the section of grating near the controls could be made of steel plate and thus prevent discomfort.

For automatic control of engine speed there is a safety-governor of the builder's own design, but we take the liberty of suggesting that the majority of other merchant marine Diesel engine builders have yet found nothing more serviceable than the Aspinall type of governor similar to that used on ordinary marine steam ingines.

Lubrication to all main and big end bearings, as well as crosshead guides and pistons, are oiled by a pressure system, the engine being totally enclosed. All drip-oil is collected in the oil-trough below the crank-case, whence it flows to the oil-pump through a suction filter. Crosshead pin bearings are lubricated by a special pump which delivers the oil at a high pressure through a set of telescopic tubes to the bearings. The main cylinders, scavenge-pump and compressor cylinders are lubricated from small piston pumps, the quantity of oil being regulated by sight feeds.

Finally we will refer to the valve actuating and maneuvering mechanism. Operation of the valves is effected by means of a double set of cams for ahead and astern running mounted on a horizontal shaft arranged alongside the cylinders. The camshaft is driven from the crankshaft through the medium of a vertical shaft fitted with helical gearwheels.

Starting is accomplished by compressed air led to all the cylinders. After the engine has obtained sufficient speed the starting air is shut off and the fuel injected into each cylinder successively. This operation is achieved by moving first one lever for two cylinders in the running position, and as soon as these "fire" the lever cylinder. The plungers are fixed to a of the other two cylinders is also brought in the running position. Starting and reversing operations are effected by means of an air-motor. Simplicity is the outstanding feature of the method of reversing. Two separate cams and rollers and provided for each valve to be operated and a simple method is employed for moving the proper roller into contact with the proper cam required for the desired direction of running. The mechanism is completely interlocked so that the valve gear may be put in the reversed direction only when the fuel control is in the stop position and starting air can only be admitted to the cylinders after the valve gear is in "ahead" or "astern" position. While maneuvering the valve gear is controlled automatically by the fuel supply. The lift of the fuel-needle can easily be adjusted by the reversing hand-wheel both for "ahead" or "astern" running, whereby the advance opening period of the needle never varies. This arrangement claims the advantages of smokeless combustion at all loads and great saving of fuel and injection air.

We are able to give a few details of the design of the largest marine Diesel engine in the world which has been standardized by the Sulzer Company. They are prepared to build this engine for private or government account. Parties with sufficient foresight to build a passenger and cargo motorship, fitted with one, two or three such motors, should speedily avail themselves of this opportunity.

This engine is of 4,200 shaft h.p. at 100 r.p.m. on a weight of 300 tons, and in six cylinders. This power is equivalent to nearly 5,000 steam indicated h.p.

For a triple-screw passenger liner three engines would mean 15,000 "steam" i.h.p., having a total machinery weight (with auxiliaries) not exceeding 1,050 tons, occupying an engine-room space not over 65 ft. long, and having a total fuel-consumption of under 60 tons of Mexican crude-oil per 24-hour day, including all the necessary ship's auxiliaries. What this means to the earning capacity of a Line operating vessels of about 17 knots speed can be estimated by the owners themselves. There is little risk in the "experiment," as there already are in service two Sulzer Diesel engines of 4,000 to 4,500 shaft horsepower, one being in daily operation at Harland & Wolff's dry docks.

About 15½ knots could be obtained with three motors in a 15,000-ton d.w.c cargo vessel, and she would burn less fuel than a 12-knot 12,000 ton d.w.c. oil-fired geared-turbine ship, also she would carry nearly 5,000 tons more cargo on a long-distance voyage.

This 4,200 shaft h.p. marine engine is 53 ft. 5¾ in. long by 10 ft. 8 in. high, and 9 ft. 10¾ in. wide, and is a six-cylinder unit. The adoption of turbo-blowers should decrease even this short length. In general design it follows the engine just described.

During the war Sulzer-Diesel engines were fitted in the ships of several navies, including France, Great Britain, Japan and America, and in our December issue we intend giving photographs and details of a number of large motor warships, powered with Sulzer-Diesel sets, also illustration of their 2,000 shaft h.p. submarine Diesel engine.

Generated on 2024-09-13 14:08 GMT / https://hdl.handle.net/2027/mdp.39015084660912
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN